ECoS ESU COMMAND STATION

User Manual

For ECoS with coloured display, firmware 3.1.x.
First edition, February 2010

ESU P/N 00810-08526

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1. Declaration of Conformity

We, ESU electronic solutions ulm GmbH & Co KG, Industriestrasse 5, D-89081 Ulm, declare herewith in sole responsibility compliance of the product

ECoS ESU Command Station

to which this declaration is related to , with the following standards:

EN 71 1-3 : 1988 / 6 : 1994 – EN 50088 : 1996 – EN 55014, part 1 + part 2 : 1993
EN 61000-3-2 : 1995 – EN 60742 : 1995 – EN 61558-2-7 : 1998
ECoS bears the CE-mark according to the guidelines as per 88 / 378 / EWG – 89 / 336 / EWG – 73 / 23 / EWG
The ECoS bears the CE mark.

2. WEEE-Declaration

Disposal of old electrical and electronic devices (applicable in the European Union and other European countries with separate collection system).

This mark on the product, the packaging or the relevant documentation indicates, that this product may not be treated as ordinary household garbage. Instead this product has to be delivered to a suitable disposal point for recycling of electrical or electronic equipment. By disposing of this product in the appropriate manner you help to avoid negative impact on the environment and health that could be caused by inappropriate disposal. Recycling of materials contributes to conserve our natural environment. For more information on recycling this product please contact your local administration, the rubbish disposal service or the shop where you have purchased this product.

Batteries do not belong into household trash!

Please do not dispose of discharged batteries in your household trash: take them to a collection point at your local town hall or dealer. Thus you assure an environmentally friendly way of disposal.

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Duplication and preproduction of this documentation in any shape or form requires prior written consent from ESU.

3. Important Remarks - Please read this section first

We congratulate you to your purchase of an ESU ECoS Digital Command Station. ECoS is a modern, intelligent model train control system designed with the future in mind. In a short time you will experience how easy it is to run trains and other devices on your layout with ECoS and to discover new undreamt-of possibilities for your hobby thanks to a unique variety of functions. Due to new functions you will quickly find out how easy it is to run your model trains with your ECoS.

This manual will guide you step by step through the multitude of possibilities of ECoS. However, have one request:

Please read this manual carefully prior to initial operation. Although ECoS is robustly constructed there is the risk of damage due to incorrect wiring. If in doubt, avoid any „costly" experiments!

- ECoS is only intended for the use with electrical model train layouts. Never operate ECoS without paying attention and never use it for controlling devices designed for transporting persons.
- ECoS is not a toy. Make sure that children use this device only when adults are present.
- Only use the power supply provided for ECoS: Other transformers may lead to reduced output or in extreme cases to damage of the command station.
- Use the power supply provided with ECoS for the energy supply for ECoS only and not for any other household appliances.
- Never use Y-adapters in order to provide power to other devices for your model trains! An unintended connection to ground could lead to damage or destruction of your ECoS!
- Check the power supply regularly for damage on the housing or the mains cable. Damaged parts may not be used under any circumstances! Do not attempt to repair the power supply! This may be fatal!
- Assure adequate ventilation of the power supply. Do not install in furniture without sufficient air circulation since this could lead to overheating or fire!
- ECoS may only be operated with the devices described in this manual. Any other use as described here is not permitted.
- Only connect devices intended for this purpose to ECoS. Even if other devices (also from other suppliers) may have the same plugs and sockets does this not automatically indicate that such devices may be operated with ECoS.
- Adhere to the wiring diagrams shown in this manual when connecting your layout. Other circuitry could lead to damage of ECoS.
- Do not drop your ECoS command station or subject it to mechanical impact or vibrations. Such rough treatment could cause breakage of components within the device.
- Never support yourself on the touch screen or sit on your ECoS.
- The monitor with integral touch screen is a precision part. Press it only lightly with your finger or the supplied peg (stylus). Never use hard or pointed objects to avoid un-repairable damage to the touch screen.
- Never expose your ECoS to rain, humidity or direct sunlight. In case of high temperature variations (e.g. when you take your ECoS from the cold car to your comfortably heated house) please wait for a few hours until the device has adjusted to the temperature before switching it on.
- When using ECoS outside you must protect it from the elements under all circumstances! Only keep ECoS outside as long as you run trains and avoid temperatures below 8° Celsius or above 30° Celsius.
- Do not use any aggressive chemicals, cleaning solutions or solvents for cleaning ECoS. Never use liquids or spray for cleaning the monitor. Instead use a clean slightly (!) moist cloth and only when ECoS is switched off.
- Do not attempt to open ECoS. Inappropriate handling may lead to damage of the command station.

3.1. What does M4 mean?

At some points in this catalog you will notice the term „M4" for the first time rightly wonder what this might mean.

This question can be answered quite simply: from 2009 forward, M4 is the name data protocol that was chosen by ESU to be implemented in their decoders. Decoders with the M4 protocol are one hundred percent compatible with command using mfx®. At such stations (e.g. Märklin® Central Station®) they will be recognized automatically and all playing functions are available just like when using mfx® other hand, our ESU command stations using M4 will recognize all (Märklin® and mfx® decoders without any restrictions and will still work without any problems. the (mutual) inventor of mfx® we can assure you of this. In short: the technique stays the same, only the name has been changed.

4. Introduction – What can ECoS do?

ECoS is a state-of-the-art complete digital control system for model trains of all gauges. ECoS combines several devices in one unit and a shapely body:

- A multi-protocol digital command station. Suitable for easy mixed operation of mobile and stationary decoders suitable for Motorola®, DCC, M4 and Selectrix® protocols.
- Large high-resolution TFT colour display with touch screen. It serves for displaying information in plain text and very easy menue-guided operation.
- Two ergonomic cabs with easy to grip throttle knobs, 4-way joystick and 9 function buttons each.
- An integral booster with up to 4 Ampere output for supplying „digital power" to your the tracks of your layout. A feedback decoder as per the latest NMRA DCC standard („Bi-directional Communication, RailCom®) is supplied as an integral part.
- Sockets for connecting external boosters compatible with DCC or Märklin® 6017. Simply continue to use your own boosters.
- One socket for wiring the programming track. With this you can read out and program your mobile decoders independent from the layout suitable for DCC, Selectrix® and programmable Motorola®-decoders (e.g. ESU LokPilot® mfx®, LokSound® mfx®).
- A computer interface (10 MBit Ethernet LAN, RJ45) allows you to download software updates, save and restore your configuration as well as controlling your layout with a PC (with the aid of dedicated software by several suppliers).
- ECoSlink high-speed bus. You may connect up to 128 other devices to ECoSlink. Other handheld (wireless) controllers, boosters, bus distributors or feedback decoders, they all will be detected automatically once they are plugged in: this is true „Plug & Play".
- s88-feedback bus. This popular feedback system by Märklin® enables you to control routes or to automate train movements „shuttle train (shuttle trains).
- ECoSniffer-input. The port for any DCC resp. Motorola®-capable, already available digital command stations: Continue to use your favourite handheld controllers and accessory keyboards – not a problem with ECoS.
- The ECoSlot module expansion compartment allows upgrading of ECoS with new components at a later stage, e.g. a receiver module for the ECoSControl Radio handheld throttle.

All above mentioned parts and components enable you to run your trains with never before imagined comfort and ease. You may fully focus your attention on your trains while ECoS takes care of the details like a good co-pilot. And here are all the things you can do with ECoS:

- Run locomotives: ECoS handles up to 16384 locomotives and stores the name, a symbol, the function buttons and their corresponding symbols, address and data format. As from now on you will call up your locomotives by their name and do not have to remember address numbers any longer!

- Controlling accessories. You can assign names and symbols to up to 2048 turnouts, signals and other accessories with solenoid drives and comfortably control them with the integral switch panels.
- Multi-traction (consists) are a basic function for ECoS: Assemble any locomotives to a consist and control them simultaneously.
- Routes are really no problem for ECoS. Group your accessories and then switch them together; either manually or triggered by an s88-feedback contact.
- The integral switch panels (turnout control panels) enable you to graphically display the topology of your layout and to switch accessories or routes directly on the panel(s). Several panels and an extensive choice of symbols allow you to display even complex layouts.
- The shuttle train mode caters for up to 8 different "out and back" lines with two each s88 contacts. This enables you to run shuttle trains between two points in a simple manner.
- The integral turntable control feature displays the Märklin® turntable on the monitor and enables you to directly select the desired track position.
- Programming decoders: Due to the monitor programming becomes as easy as never before: All parameters are shown in plain text and avoid mistakes. Set your locomotives onto the programming track or use P.O.M. (Programming On the Main).
- In most cases you can continue to use your „old" digital system: Provided it „speaks" DCC or Motorola®, you may connect it to the ECoSniffer port and thus use all your present handheld throttles.

5. Unpacking & Set-up

5.1. Opening the package

The ECoS – command station is safely protected in two cartons when delivered. First open the brown shipping carton at one end and pull out the printed carton. Now pull out the two-part blister pack and place it on a table with the monitor of ECoS facing upwards.

The upper half of the blister is secured to the lower part with several buttons. No adhesive has been used. Pull both blister halves apart at each button until you can separate the two halves.

Please keep the packaging in a safe place for later use. Only the original packaging guarantees protection from transport damage. Pack your ECoS into the blister and both cartons prior to dispatch by mail or parcel service.

5.2. Locating the device

Place ECoS on a flat, clean and dry surface within sight of your model train layout. Assure a stable position of ECoS and an optimal distance between yourself and the command station. The monitor is tilted at 12 degrees against the support surface and is best suited for a sitting operator (easy reading of text, etc. on display).

Avoid reflections of bright walls or lighting equipment on the monitor.

Provide suitable conditions for your ECoS: ideally operate ECoS at room temperature. Avoid heat sources in the immediate surroundings. Generally it can be said that any room conditions that are comfortable for you will be good for ECoS.

Figure 1

5.3. Inserting rechargeable batteries

We recommend always operating your ECoS with batteries in place. A set of batteries is supplied with your ECoS. The batteries assure trouble free shutdown by saving all settings in case of a power cut. This "emergency power supply" is needed in order to bridge the short time span between power cut and shutdown of the device.

The batteries may be removed without any problems once the ECoS has shut down. All settings are safely stored in the flash memory. The batteries are automatically recharged during operation.

If the ECoS has been turned off for an extended period (summer break) it should be operated for at least four hours in order to recharge the batteries sufficiently. Please also take note of the hints regarding switching off your ECoS in chapter 9.2.

The battery compartment is located at the back of ECoS.

Figure 2

- Remove the cover by pressing the clip in the direction of the arrow.
- Insert four rechargable batteries in the correct polarity. The poles („+" and „-") are imprinted in the battery compartment.
- Close the cover of the battery compartment.
- Only use rechargable high-quality batteries or accumulators.
- Remove the rechargable batteries only when ECoS is switched off (pull mains plug).
- After longer periods without operation (e.g. after the summer vacation) please remove the rechargable batteries to avoid any leakage.

- Never attempt to insert ordinary batteries in your ECoS! The electronics of the charger cannot detect this fact and will try to recharge such batteries as well.

6. Starting up quickly

After working through this you will be able to carry out a quick test of your ECoS command station and to do the „first laps" with one locomotive.

Please read the entire manual before you wire your ECoS permanently to your layout.

6.1. Overview of possible connections

All sockets are located at the back of your ECoS command station:

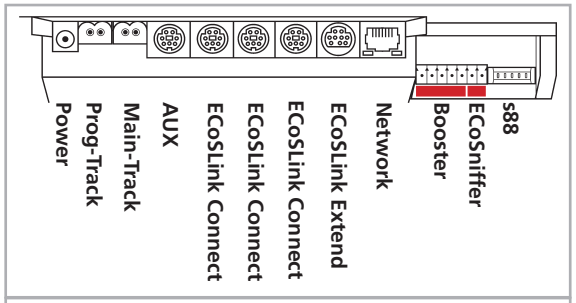

Figure 3

Power:	Socket for power supply of ECoS and your layout. Connect this socket only with the power supply delivered with ECoS.
Prog-Track:	Two-way socket (5.08mm contact spacing) for programming track (optional)
Main-Track:	Two-way socket (5.08mm contact spacing) for mainline
AUX:	Socket for future extensions. Currently not in use.
ECoSlink:	Three seven-way Mini-DIN sockets for direct connection of external ECoSlink devices (handheld controllers, boosters, feedback decoders, etc.)
ECoSlink Extend:	Nine-way mini-sockets (DIN) for wiring bus-extension modules to ECoSlink (up to 100m total length)
Network:	10MBit Ethernet RJ45 socket for connecting ECoS to a computer network
s88:	Six-way pin-connector for wiring Märklin® s88-compatible feedback decoders (up to 32 modules)
ECoSniffer:	Two-way socket (3.5mm contact spacing) for connecting existing digital systems. Wire the track terminals of your „old" command station to this socket.
Booster:	Five-way socket (3.5mm contact spacing) for wiring external boosters compatible with DCC-standards or Märklin® 6017.

6.2. Minimal wiring for an initial test

- Connect the power supply to the appropriate socket of ECoS.
- Wire the two terminals „Main" to your test track.

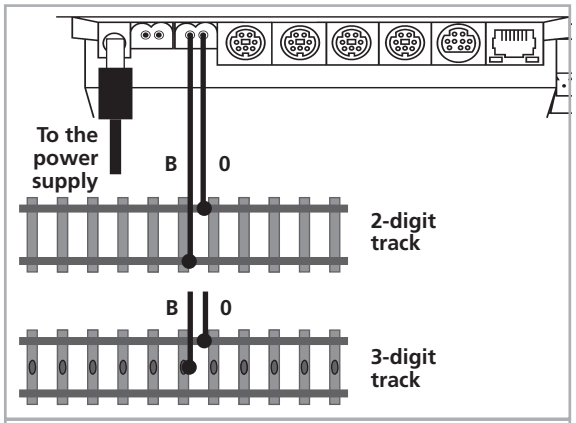

Figure 4

With DCC-systems polarity is not an issue.

If you use three-rail-tracks you must observe the correct polarity ("B", "0"); otherwise many older locomotives and accessories (e.g.: k83, k84) may not function properly.

6.3. Overview of control input elements

All control input elements of ECoS are located on the top of the housing as per Figure 5 below.

a) Function buttons on the left. The headlight function as well as F1 to F8 of each locomotive may be activated directly by pressing these buttons. An integral LED in the buttons displays their status.

b) Left throttle knob with definitive end position and change-of-direction function. Turning the knob clockwise increases the speed while turning anti-clockwise reduces the speed.. The position of the knob corresponds with the speed. Turning the throttle knob to the left beyond the „Zero"-position to a clearly audible and mechanical „click" changes the direction of travel.

c) Four-way joystick with centre-click-function serves for navigating in the menues, selecting locomotives and to trigger the whistle („Playable Whistle") of locomotives equipped with suitable decoders.

d) "Stop" button: immediately turns off the track power. Also serves for turning off the ECoS at the end of operations (more on this in chapter 9.2).

e) "Go" button: turns on the track power of the command station: power is available at the track terminals.

f) Function buttons. The first 8 functions of each locomotive can be directly activated by pushing one of these buttons.

g) Throttle (right hand side) with limit stop and change-of-direction function.

h) Storage space for stylus.

i) Touch-sensitive touch screen with LCD display.

j) Stylus

k) Locomotive selection button. Calls up the locomotive menu for the respective cab.

Figure 5

6.3.1. Main menu

Besides the operating controls the touch screen provides more important information for each displayed locomotive.

a) Name of locomotive: displays the name of the locomotive (can be made up of letters and numbers).

b) Locomotive symbol: displays the symbol of your choice (can be freely selected).

c) Speedometer display: shows the current speed.

d) Speed indicator: displays the current speed step. The range of values depends on the data format of the locomotive decoder. Subject to the locomotive settings the speed in km/h may displayed instead of the speed steps.

e) Direction of travel „Forward“: is highlighted, if the locomotive travels forward.

f) Direction of travel „Reverse“: is highlighted, if the locomotive travels backwards.

g) Locomotive selection button: Pressing this screen button on the touch screen opens the locomotive selection menu. Press this screen button every time you wish to run another locomotive with this cab. Alternatively you may press the locomotive selection button.

h) Locomotive menue: after pressing this screen button you can enter, edit or delete new locomotives or consists or assign shuttle trains.

i) Function button symbols. Depending on the data format and setting you may switch on and off up to 20 functions in each locomotive by touching the appropriate symbol.

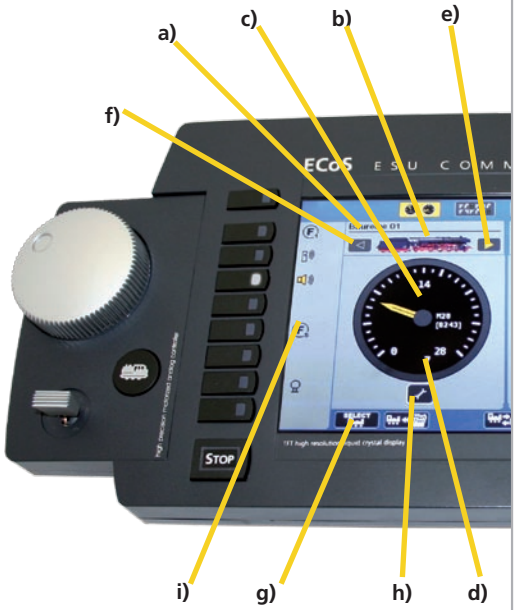

Figure 6

6.3.2. Touch screen

As the name says the touch screen responds to contact with your finger or with the stylus. Please do not use any hard or pointed objects; this could lead to permanent scratches on the surface.

6.3.2.1. Calibration

The touch screen is normally calibrated ex works. Calibration allows equalising any manufacturing tolerances. After a software update the device may not be calibrated any more. In that case the calibration window opens immediately after starting the ECoS.

Push the small cross on the screen with the “stylus” provided. The cross will jump to another position immediately. Try to press this symbol as close to it’s centre as possible. After you have repeated this process three times calibration is completed. For further information see page 37, chapter 21.9.

Confirm the calibration by pressing the screen button on the left of “Save calibration and exit this menu”.

At all times certain information as well as screen buttons are displayed on the screen. Whenever you press one of these screen buttons an action will be triggered.

Examples for screen buttons:

Touching this screen button confirms an action.

Touching this screen button cancels an action; any data entered during this particular process will not be saved.

In some menues you can select or cancel certain options by touching the screen button („ticking them off electronically“).

Choice lists are opened by touching the right arrow on the heading of the list. Then a list of available elements appears.

Slider: Slide controllers enable you to comfortably set values.

Input fields are for entering text or numbers with the aid of the display keyboard.

6.4. Your first train – call up a locomotive and run it

We want to show you how easy it is to enter, call up and run a locomotive. First make sure that ECoS is connected as per the instructions and turn on the power supply.

ECoS needs one to two minutes for initialisation („start-up“). A small square at the bottom of the monitor runs from left to right to indicate this process. As soon as ECoS is ready the „Go“-button lights up (green). During the booting it could happen that the screen switches off from time to time. This is a normal occurance.

Any audible chirping from the command station is quite normal and no reason for concern.

Before we can run a locomotive we must enter this locomotive in the internal locomotive list of the ECoS. In our example we assume that you have a locomotive operating with the Motorola® data format that does not report automatically to the command station.

Press the screen button “Locomotive menu” on the display and select “New locomotive” and then “Manual entry”.

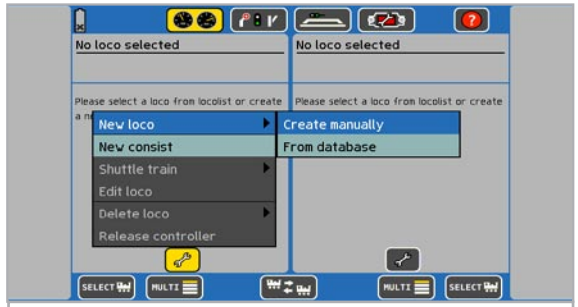

Figure 7

In our example we would like to run a locomotive with the address “44”. Therefore we have to replace the number in this field (currently: 3) by the desired number.

Press the screen button “Display keyboard” in order to open the data entry window.

Press the “Delete” screen button in order to cancel the number “3”. Then type “44” and confirm by pressing “Ok”.

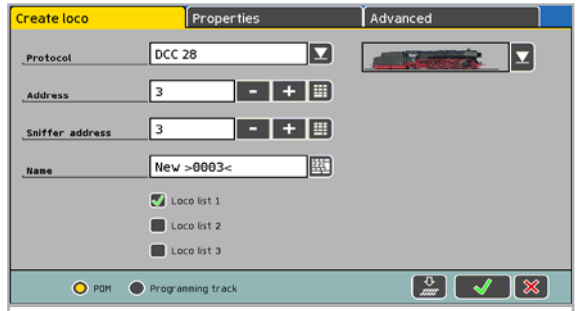

Figure 8

In our example we assume that this locomotive operates in the Motorola® format. This is the default setting. If you wish to run this loco in the DCC format, press the arrow behind “Data format” and select “DCC 28”.

Confirm your entry by pressing “Ok”. Then you will arrive at the train control screen (cab) automatically; the newly entered locomotive is called up and ready to run.

Figure 9

- Turn the throttle to the right and the locomotive will start moving. The speedometer will display the correct speed right away while the speed steps for precise control are displayed as well (refer to Fig. 6d).

- Turn the throttle to the left beyond the Zero position until you hear the click and the direction of travel will be changed. The throttles are also motor driven. Whenever you turn the throttle to the left and thus change the direction you may simply release the throttle and it will automatically return to the Zero position.

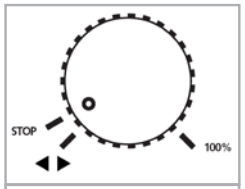

Figure 10

- You can turn on or off the locomotive functions by pressing the appropriate buttons or by touching the screen buttons.

How to continue from here? Please take the time to work through the following chapters. Please take into account that it will take some time to get to know the manifold new functions. Be patient and take your time to try out some of the features. We wish you lots of fun in discovering your "new" ECoS.

7. Features of the ECoS

ECoS is a state-of-the-art digital command control system and offers many features. We want to explain the possibilities and some technical background in greater detail. The detailed operating instructions are given in chapter 10. If you wish you may turn to these pages right now if you do not want to know the technical background at this stage.

7.1. Running locomotives

ECoS can control up to 16,384 locomotives simultaneously. Of course, this is only a theoretical number that will hardly be reached in practice. The electrical power required for so many locomotives would far exceed the maximum number of 128 boosters. The response times for each locomotive would also be unacceptably long. As a multi-protocol-system ECoS supports several data formats for running your locomotives.

7.1.1. Data formats

7.1.1.1. Data format Motorola®

Motorola® I („Old" Motorola®-format)

First generation Märklin® locomotives support this format in which the status of the lighting function is transmitted besides 14 speed steps. Only when changing direction a special signal will be sent to the locomotive. However, it is possible that the direction status of the locomotive and the command station status for this loco do not correspond initially. In this case you would have to change direction once more to assure a corresponding status.

Motorola® II (so-called new data format)

Besides the 14 speed steps a signal indicating direction of travel is transmitted continuously. The info regarding direction always corresponds between command station and locomotive.

The status of F1 to F4 is transmitted in a separate packet. This is only generated if the status of at least one function has changed. Advanced decoders store this information locally to assure that it corresponds with the command station even in case of a power interruption.

ECoS does not differentiate between Motorola® old and new but transmits (by using a special method.) data packets in both formats.

In ECoS we call this mode *„Motorola14"*.

Märklin® built an extension into their decoder series 6090x to provide 27 speed steps: the so-called „half speed step" between the actual speed steps increases the resolution. The command station must transmit specific command sequences in order to achieve this. ECoS knows this mode as *„Motorola27"*.

If you run a locomotive in „Motorola27" mode and you notice that functions are only activated at every second speed step, then your decoder does not support the 27 speed steps. Please switch to „Motorola14".

ESU extended all decoders to suit the Motorola®-format by an additional mode, namely „Motorola28". This operates with 28 real speed steps.

If you want to run a loco in "Motorola 28" format and you notice that the functions are only working at every second speed step then your decoder does not support the 28-speed step format. Run these locomotives with the "Motorola 14" format.

Märklin® released some function models to the market (e.g. 4998, 4999 or 49960, turning crane 7651 or Gauge 1 cars 58115) that have to be controlled with a data package different to the one for the locomotives. In terms of its design this data package is similar to the ones for turnouts. We call it "Motorola Fx 14".

7.1.1.2. Range of addresses - Motorola®

Märklin® defined 80 addresses for its original digital system. Since this number is far too small for many applications several decoder suppliers extended the range. ESU LokSound V3.4 M4, LokPilot V3.0 M4 and LokPilot V3.0 support 255 addresses in the Motorola-format.

7.1.1.3. DCC-Format

The DCC standards published by the North American NMRA (National Model Railroad Association) is based on a development by the German company Lenz Elektronik.

In DCC-format up to 10.239 addresses, up to 21 functions and up to 128 speed steps are encoded. In practice only 126 speed steps can be used, the others are reserved for the emergency stop function. The absolute direction of travel is also encoded. How many of these addresses, functions and speed steps are actually available depends on the type of decoder and the command station. ECoS supports currently all known DCC formats.

We differentiate between 14, 28 and 128 speed steps. In the latter case 126 speed steps can actually be utilised.
Subject to the mode in which you want to run your DCC locomotive please select „DCC14", „DCC28" or „DCC128" as data format.

Please bear in mind, that the information regarding the speed steps transmitted by ECoS has to correspond with the speed step setting of the decoder. A data packet for „DCC14" is for instance identical to one for „DCC128", but will be „understood" differently by the decoder. If the settings do not correspond then the headlights of the locomotive will blink slowly while the locomotive is accelerating.

If you are not sure which DCC modes are supported by your decoder try DCC 28 first. This is the compulsory mode as stated by the NMRA. All ESU DCC decoders detect the number of speed step automatically. You may just as well start with DCC 128.

7.1.1.4. LGB®-Format extensions

LGB® uses the DCC protocol for operating garden railways. The old Lokmaus® had only one function button „F1" besides the lighting button. But how could you switch so many functions with just one button?

The „solution" was what became know as the „sequential function status mode". The user knew if he for instance wanted to switch function F3, he had to press F1 three times in a row. The decoder counts the number of status changes and then switches the desired function. The disadvantage of this method is that functions with higher numbers (e.g. F8) take longer to respond, since several „on-off" commands have to be transmitted.

Should you have any LGB® locos with such decoders and you want to run them with ECoS select the „LGB" format. It corresponds to the „DCC14" format, but the functions are activated sequentially in the background.

Modern LGB® locos or such locos with ESU LokSoundXL decoders understand alternatively „DCC28" resp. „DCC128". If in doubt, simply try it.

7.1.1.5. Selectrix®

ECoS can control all locos with Selectrix® decoders. In this mode 112 addresses, 31 speed steps and two function buttons (Light and F1) are available. ECoS calls this mode „Selectrix".

7.1.1.6. M4

Of course the ECoS also supports the M4 protocol. When using the appropriate decoders such as Märklin® mfx® decoders or ESU LokSound M4 resp. ESU LokPilot M4 the command station automatically detects and recognises such decoders and incorporates them into the operations. Simply assign names to these locomotives! In an M4 system there are no addresses; all locomotives with M4 or mfx® decoders report automatically to the command station. You will immediately see the locomotive name on the display. This is true "Plug & Play". Of course you may change the name at any time should you wish to do so. For instance you could convert a "class 232" to "Ludmilla".

In M4 mode there are up to 16 functions per locomotive. The appropriate symbol is displayed on the screen of the command station next to the function button. The decoder also informs the command station if a function is set to momentary action (e.g.: for the whistle or horn) or a continuous function (e.g.: for the pantograph).

Every M4 decoder supports 124 speed steps for smooth acceleration.

With the software 3.0.0. it is now also possible to run locomotives in M4 mode with 28 speed steps. This helps to reduce the number of turns of the throttle considerably until the maximum speed is reached.

7.1.2. Multi-protocol operation

ECoS can transmit all above formats in sequence. Thus each loco can be controlled with its own data format. Mixed operation of different decoders on the same track is generally possible without any problems.

Some very old decoders may not be able to function properly if another format is transmitted to the track besides „their own". This may result in uncontrolled acceleration, blinking headlights or other abnormal behaviour.

The very first series of Märklin® signals 763xx may get confused if you run other data formats besides Motorola®.

If there is no colour mark at the underside of your Märklin® signals we recommend to get them updated. A software update makes them suitable for multi-protocol operation.

7.2. Consisting

ECoS enables you to set up and control consists of two or more locos comfortably. All locos are listed in the memory of ECoS. ECoS transmits separate signals (in the required data format) to each loco of the consist. This happens at high speed so the locos work like one. Therefore it is possible to operate and display consists with locomotives whose decoders cannot support consist addresses. Furthermore it is also possible to form consists consisting of locomotives with different decoder types and protocols.

Locomotives running in a consist should have uniform characteristics. If necessary adapt the locomotives by reprogramming the acceleration rates and maximum speeds prior to forming to a consist.

You may assign a name and symbol to a consist in ECoS in the same way as for a loco. A consist is always run with 128 speed steps.

The available functions in a consist are determined by the leading loco who's functions will be displayed on the monitor. The activated functions will be signalled to all locos in the consist.

Locos of a consist can be called up on another throttle, but they cannot actually be run with that throttle.

7.3. Running shuttle trains

Many model train enthusiasts do not want to run their trains simply „in circles" but want to have real point-to-point operation. Branch lines onto mountains with terminal stations at either end, small branch lines with a connection to a main line, but also modular layouts are typical examples for such point-to-point scenarios.

In ECoS we differentiate between shuttle tracks and shuttle trains (locos) that run on these tracks (out and back). While the tracks have to be set up only once it is quite possible to have different locos on such a track. You may change the locos and easily determine which trains should serve a particular branch line.

ECoS can handle up to 8 shuttle lines and run one loco each on each of these 8 lines. ECoS slows down the trains automatically when they reach the end of the line, changes the direction and lets the loco depart after a pre-determined layover time.

To detect the stopping point we use contact inputs of the s88 bus. One s88-input is needed for each stopping point.

Such trains are stored in the virtual memory of ECoS. Thus this feature is available regardless of the decoder type.

7.4. Accessories with magnetic drives (solenoids)

One of the main features of ECoS is controlling accessories / turnouts. By magnetic accessories we mean any device that is operated by one or more solenoid drive. Amongst others these are turnouts, signals, un-couplers or relays to switch lights or motors.

ECoS can switch such devices via an accessory decoder.

Such stationary decoders are available from many manufacturers.

The most popular is probably the Märklin® K83 ands compatible models. All such decoders can be used provided they

- are compatible to Märklin® K83 resp. to Märklin® K84 and understand the Motorola protocol or
- can process the appropriate DCC-format. DCC-accessory decoders must comply with the „DCC accessory decoder" standards.

Some accessory decoders by Roco® behave like loco decoders to enable them to work with the Lokmaus®2. Such decoders can only be operated with ECoS provided they can be set to a DCC-compatible mode.

With the SwitchPilot and the SwitchPilot Servo ESU offers two versatile, affordable decoders that work perfectly with the ECoS.

Wire accessory decoders as described in the manual. Some accessory decoders are suitable for an external power supply for the solenoids. We recommend a separate power supply for all larger layouts: definitely use a separate transformer. Do not use the ESU power supply for t his purpose.

Please observe the correct polarity of the track power when using k83 / k84 or compatible decoders.

Besides the classic accessory applications (turnouts, signals) the ECoS can also control Märklin® turntables. The turntable will be displayed on the screen.

Similar to the locomotives, accessories are stored in lists of the ECoS. Each accessory may be given a name and a pictogram. This pictogram represents the type of function. The ECoS differentiates between two-, three- and four-aspect accessories. For the three- and four-aspect accessories it is assumed that the second drive will be wired to the address following the one of first drive of the same accessory.

Example:

For a three-way turnout with the first address of 51 the second address is automatically 52. The red output of the following address (in this case: 52) cannot be used for other devices.

ECoS offers an integral control panel for turnouts with 74 levels (sub panels) with 16 each accessories. Thus you can arrange your turnouts in groups and manually call them up when necessary.

7.5. Routes
In practice it is often useful to switch groups of turnouts and signals and bring them into a pre-defined status instead of switching them individually. ECoS allows you to combine them to a so-called route. Switching a route is done in the same way as switching an individual turnout except that all devices that are part of this particular route are quickly switched in sequence on after another to reach the required status.

Routes are also stored internally and can be displayed with a specific symbol on the turnout control panel. ECoS can handle up to 1024 routes with 256 individual devices each.

Each accessory can be part of as many routes as desired and, of course, with different status or aspect.

ECoS transmits the appropriate signals in sequence – with an adjustable gap between the individual signals. The duration of the pulse depends on the type of accessory.

Routes can also be switched with s88 contacts: you can link any s88 contact with any route. Thus it is possible to arrange sequential processes and block protection.

7.6. Switching panel and track diagrams
The ECoS offers an integral track diagram feature. This enables you to display the topology of your layout on the screen and to switch accessories and routes directly on the track diagram. Each panel has 23 x 11 fields for the entry of symbols. With the available symbols you can draw just about any track configuration. Larger layouts can easily be divided over several panels. Direct references to other panels assure quick and easy access without the need of time consuming searching.

7.7. Programming decoders
In principle the command station "supports" three types of programming and two types of protocols: The ECoS supports both DCC programming as well as Motorola® and M4 programming.

7.7.1. Programming track
The programming track must be completely (!) isolated from the rest of the layout and must be wired directly to the programming track output of ECoS.

There should always be only one loco on the programming track at any point in time. You may read out and write new values. All DCC decoders are suitable for programming on the programming track as well as programmable Motorola® decoders (e.g. LokSound M4, LokPilot M4). DCC decoders cannot only be completely re-programmed on the programming track; it is also possible to read the values.

7.7.2. Programming On the Main
DCC decoders can be re-programmed directly on the main (also known as „Programming On Main" or „POM"). The great advantage is that any new settings can be monitored while running the loco and without having to take it to the programming track.

7.8. Feedback with s88
ECoS offers a factory built-in galvanically isolated (!) input for the very popular s88-modules. They serve as track occupancy detectors and may be used for controlling routes and shuttle train operations.
The s88-bus consists of up to 32 s88-modules that can process either 8 or 16 feedback signals each. These modules are wired in a „chain" (bus). s88-modules are available from various manufacturers.
The number of existing s88-modules is configured in ECoS in such a way that response times are as short as possible: since the modules are checked continuously in sequence, only really existing modules should be monitored.

7.9. Continue to use your old system with ECoSniffer
ECoSniffer represents a very special feature of ECoS. It allows you to use your existing digital system even when upgrading to ECoS. Simply wire the track output of your old system to the ECoSniffer sockets. ECoSniffer then monitors the signals transmitted by your old system and „translates" them into ECoS commands.

Therefore it is possible to use any existing command station as long as it is suitable for either Motorola® or DCC since ECoSniffer is multi-protocol-capable (since the update V3.0.0).

It „understands" commands for locos in DCC (14, 28 or 128 speed steps, auto-detection, up to 12 function buttons), Motorola® (14 speed steps, 80 addresses, Motorola® old and new, up to 4 function buttons) as well as commands for accessories in DCC and Motorola®. All other commands from the old system (perhaps programming commands) will be ignored.

One can connect only one digital command station to the ECoSniffer. The number of cabs that can be connected to your old system is subject to the limitations of your old command station. Thus you may for instance hook up your "Lokmaus" system with up to 32 "Lokmaus" cabs or your Loconet® command station with all its connected cabs and continue to use them as before.

If you wish to control accessories with your old system you must first enter them locally in your ECoS. Otherwise the commands will be disregarded. Chapter 13 explains how to enter accessories. In the same manner locomotives that you want to control via your old system must be entered in the memory of your ECoS. Chapter 11 provides details.

7.10. ECoSlink bus system
Our bus system ECoSlink allows for the extension of your ECoS command station. You may connect external handheld throttles, feedback modules, boosters and other extensions. ECoSlink is based on the CAN industrial standard, is suitable for a maximum cable length of 100 metres and provides excellent data transmission. ECoSlink operates with 250 kBit / second and is "hot-plug" and „plug&play" capable. All devices report automatically to the system and can be removed or re-connected during operation. The ECoSlink system can comprise of up to 128 devices. You will find more details in chapter 20.

7.11. ECoSlot module extension compartment
On the underside of the ECoS housing is a compartment suitable for extension modules. Thus ECoS can be extended.

ESU, for instance, offers a suitable receiver module for the radio control cab "ECoSControl Radio". This receiver expands your ECoS with a wireless cab. A real advantage of your ECoS!

8. Wiring details

8.1. Power supply

ECoS gets its power via a 2.1mm DC-socket. The secondary voltage corresponds with the track voltage; voltage stabilising or adjustments take place within the power supply, not within the command station. ECoS has its own internal protective circuitry for under-voltage and overload (-current).

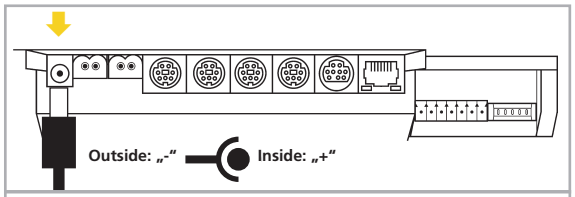

Figure 11

Supply voltage: 14V to 22V AC or DC
Supply current: max. 5A

- The peak voltage of the transformer may not exceed 22V in open circuit operation.
- The use of other power packs may lead to the destruction of the ECoS.

8.2. Power supply

A power supply with the following characteristics is delivered with ECoS:

VIn: 100V – 240 V AC, 50 / 60 Hz
Input current: 1.8A max.
VOut: adjustable from 15V - 21V DC, stabilised
Output current: 5A max.
Plug: DC plug, 2.1mm, 1.8m flying lead

Figure 12

a) Power-LED (red)
b) Output socket (low voltage)
c) Main socket

- Please use the power supply provided with ECoS solely for powering ECoS. Do not use it for other household appliances.
- Check the power supply regularly for any visible damage of the housing or the mains cable. Damaged parts may never be used! Do not attempt to repair the power supply! Extreme danger – risk of fatal injury!
- Make sure there is sufficient ventilation around the power supply. Mounting in furniture without air circulation may lead to overheating of even fire!
- First connect the mains cable with the appropriate socket of the power pack and then plug it into a suitable power outlet.
- Never use V adapters for connecting the power pack to other devices besides the command station! This could cause an inadmissible contact to ground that could lead to the destruction of your command station!

8.2.1. Setting the input voltage and output voltage

The power pack generates a stabilised voltage that serves to power your model train layout. The output voltage must be adjusted to the appropriate value subject to the scale of your trains.

For this purpose there is a small, round opening at the front of the power pack that allows you to set the voltage with the aid of a screw driver:

Left hand limit: ca. 14.5V
Right hand limit: ca. 21.5V

8.2.2. Practical voltage settings

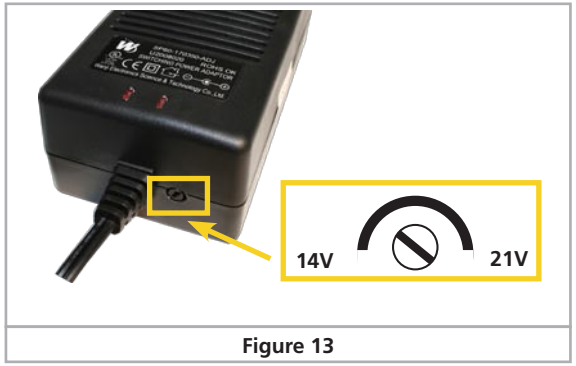

Figure 13

We recommend the following settings for the different scales:

- N gauge: 15V - 16V
- H0 DC (DCC): 16V - 18V
- H0 three-rail-system: 18V - 20V
- 1 gauge: 18V - 21V
- G gauge: 20V - 21V

The integral current monitor shows you the corresponding output voltage. With the aid of this monitor you can determine the desired voltage precisely. It is explained in greater detail in chapter 23.

We recommend proceeding as follows:

- Start your command station
- Open the current monitor
- Turn the adjustment wheel slowly until the desired voltage is displayed.

8.3. Track connection

The tracks are connected via a two-way socket with a removable plug. Please make sure you us cables of adequate size for your track power. We recommend wires of at least 1.5mm² (better: 2.5mm²) cross section. In larger layouts connect track power every two meters to the tracks.

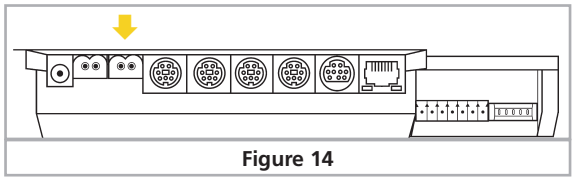

Figure 14

ECoS uses an H4-bridge (full bridge) for the track power. Therefore with ECoS – contrary to older Märklin® systems - there is no „Common" (Ground).

Nevertheless it is advisable to use a common ground (normally the rails) in existing three-rail-systems with several power districts (boosters).

- Never connect another digital system or analogue transformer to the same circuit as ECoS. Your ECoS may be damaged or destroyed!
- Please observe the need for the correct separation of all power districts should your layout be divided in several such districts. As normal practice the centre-rail will be isolated. The outer rails may form the common ground provided each booster has its own power supply (transformer).
- ECoS supplies up to 4A track current. Always consider if you actually need such a high output current. In case of a short circuit your locos may be damaged and there may be risk of fire! Reduce the maximum current to a sensible level. Also refer to chapter 21.1.3.

Remove all capacitors that may possibly haven been wired to the track power supply cable in your layout. They would cause a strong heat build-up of ECoS and impair the power output. Almost in every connecting track in an analogue starter kit (Roco®, Märklin®) are resp. were capacitors installed.

8.3.1. Wiring two-conductor tracks

Wiring takes place as shown. Polarity is not an issue (for DCC or Selectrix®).

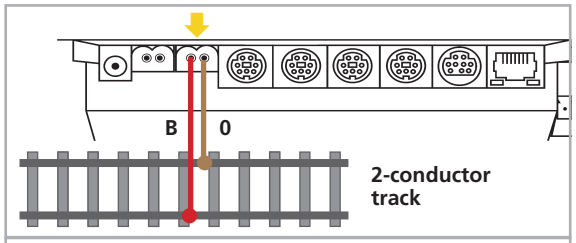

Figure 15

8.3.2. Wiring three-conductor tracks

Wiring takes place as shown. If your new Motorola® locos work but the old k83 accessory decoders and older Märklin® locos do not it is most likely that polarity has been swapped.

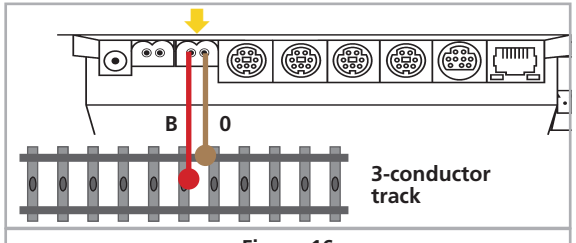

Figure 16

- Märklin® offers a suitable connecting track for the C-track system. Part number 74046 is not suitable!
- For the K track system you should use the connecting track No. 2290. Part number 2292 is not suitable.
- For the M track system you should use the connecting track No. 5111. Part number 5131 is not suitable.
- For gauge 1 the connecting set 5654 can be used in conjunction with any standard track section.

8.4. Wiring the programming track

ECoS has a separate low power output for the programming track (max current 1A). The same type of socket is used as for the mainline connection. Wire a section of track to this output that is completely isolated from the rest of the layout, ideally some short stub track.

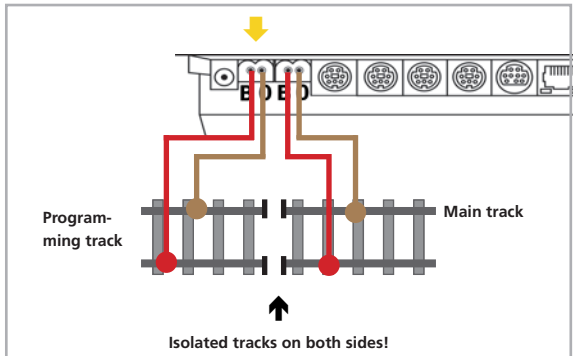

Figure 17

This track must be insulated on both sides from the layout – in case of Märklin® insulate the centre conductor and both tracks! During programming the insulating gaps may not be bridged (boogies, coaches with interior lighting, etc).

Whenever the programming track is not in use an internal relay in ECoS switches this track to the main line. Programming track and main line are synchronised. Thus you may run your locos onto the programming track and then re-program them. Only when you have started the programming procedure separate signals will be transmitted to the programming track.

There should always be only one loco or coach with decoder on the programming track to avoid unintended programming of another vehicle. After finishing the programming procedure remove the loco form the programming track. Otherwise „parked" locos could be re-programmed unintentionally.

8.5. ECoSlink

Each ECoS command station has three sockets for connecting external devices. They are called ECoSlink.

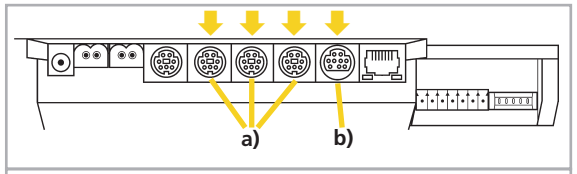

Figure 18

a) ECoSlink Connect

b) ECoSlink Extend

Should you wish to connect more than three devices you have to extend the bus with a bus-distribution-module. Either the ESU ECoSlink Terminal or the terminal box by Märklin® is suitable. You will find more details in chapter 20.

8.6. Computer interface

Each ECoS has an 8-way RJ45 network socket. This is compliant with the Ethernet standard and can be connected via a long cable to your computer network. There are two LEDs integrated into the socket:

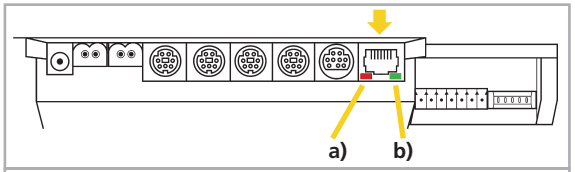

Figure 19

a) The LINK-LED lights up yellow continuously if ECoS is connected to a network. If this LED is not lit there is an incorrect or no connection.

b) The BUSY-LED blinks green as soon as there is a data transfer between ECoS and the network.

Connecting to a Hub or Switch

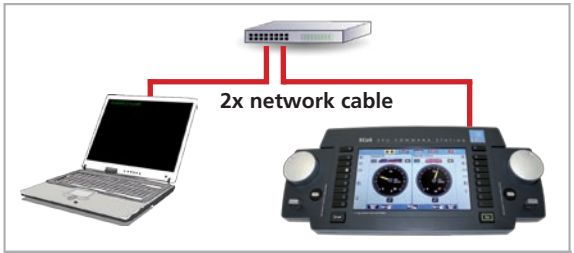

Figure 20

Use a commercially available network cable and insert it into a free socket of your Network Switch or Hub. The LINK-LED must then light up.

Direct coupling of a PC and ECoS

Figure 21

If you prefer to connect your ECoS directly to a PC without a Switch or Hub you have to use a so called „cross-over-cable". Such cables look like ordinary network cables but internally two pairs of wires are crossed. The LINK-LED lights up continuously if the connection is correct.

Connect the network output only with a computer network as per the Ethernet standard. Telephones for the ISDN standard and also other model train manufacturers use identical plug-socket-connections, but they must never be inserted into the LAN socket of ECoS.

When removing the network cable you must press the retaining lug on the plug prior to pulling out the plug. On older versions this is located on the underside of the ECoS. Release this lug carefully perhaps using a small screwdriver. In all newer ECoS models and all Central Stations® the socket has been turned by 180° and can easily be reached.

8.7. Wiring external boosters

Should the power output of the integral booster be insufficient you may connect more external boosters. For this purpose you have to divide your layout into several individual electrical sectors.

8.7.1. Suitable systems

There are 3 different types of boosters which can be used with the ECoS:

a) DCC compatible booster with 3-pole connector for wiring top the command station. These boosters can generate both Motorola® and DCC signals but not Selectrix® signals. Even though it is possible to generate M4 signals and thus run M4 locomotives, the command station cannot detect such locomotives in districts powered by DCC boosters (due to the lack of feedback).

b) Booster according to Märklin® 6017 norm. The widely used Märklin® boosters 6015 and 6017 can generate DCC signals as well as Motorola® signals but not Selectrix® signals. Even though it is possible to generate M4 signals and thus run M4 locomotives, the command station cannot detect such locomotives in districts powered by 6017 boosters (due to the lack of feedback).

c) ECoSlink system booster. ESU offers two options with the ECoSBoost 4A resp. ECoSBoost 8A. Both boosters can generate DCC, Motorola®, Selectrix® and M4 data signals. Thanks to the integral feedback feature M4 locomotives can be automatically detected ECoSBoost power districts.

The different types of booster have to be connected to the ECoS in different ways: DCC compatible boosters and boosters compliant to the 6017 standard must be wired to the external booster interface. ECoSlink boosters are to be connected directly to one of the ECoSlink sockets.

Since most commercially available boosters have problems with the Selectrix® data packet, no Selectrix® data are supplied to the external booster interface. Therefore it is not possible to run Selectrix® locomotives in districts powered by external boosters.

The boosters also differ in how they detect a short circuit and the polarity. The appropriate setting can be configured at the ECoS and is valid for all boosters connected. Therefore one should only use one type of booster with the ECoS (e.g.: only DCC compatible boosters or only 6017 compatible boosters).

We recommend only using boosters of the same type from one manufacturer. The time related behaviour of different makes varies greatly. Therefore it is likely that problems may occur whenever a locomotive crosses a district boundary.

However, mixing 6017 compatible boosters with ESU ECoS-Boost boosters is permitted. It must be noted that a rocker contact for separating the centre rail is required at the district boundaries powered by different boosters.

You can use five 6017-boosters or three 6015-boosters at most!

8.7.2. External booster interface

5-poles of a 7-pole socket are available for external boosters. This socket is equipped with removable screw type terminals.

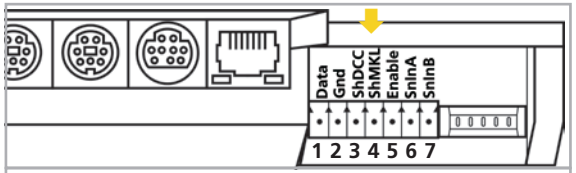

Figure 22

1 = Data	(Booster data cable has the signal)
2 = Gnd	(Ground)
3 = ShDCC	(Short circuit-feedback for DCC, shutdown if connected to GND); not used with MM® booster
4 = ShMKL	(Short circuit-feedback for 6017, shutdown if positive)
5 = Enable	(Booster „On/Off", for 6017-booster)
6 = SnInA	(ECoSniffer Track signal input A)
7 = SnInB	(ECoSniffer Track signal input B)

8.7.2.1. Connecting a DCC-booster

You must connect „Data" and „Gnd" of you r DCC-booster. If you also want to transmit short circuit data you have to connect the „ShDCC" socket.

It is not possible to run locomotives in the Selectrix® data format with a DCC booster nor can M4 locomotives be automatically detected.

A suitable terminal block (5 - pole, 3.5mm grid) is available from Conrad Elektronik under the part number 730200-62.

A Lenz®-Booster is wired as follows:

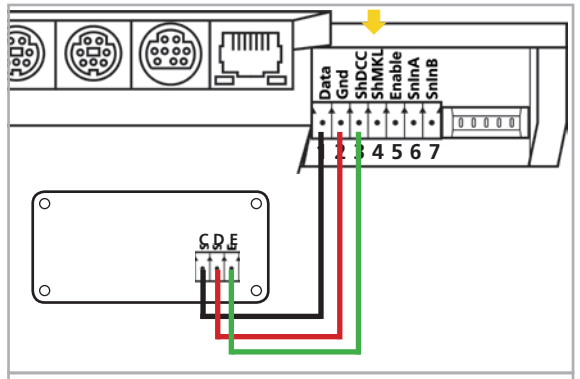

Figure 23

1 = Data	Terminal „C"
2 = Gnd	Terminal „D"
3 = ShDCC	Terminal „E"

Other DCC-boosters are wired according to the same principle. Refer to your booster manual to find out the appropriate contacts.

8.7.2.2. Connecting a Märklin®-booster

Each 6017-booster (and compatible boosters) are supplied with a 5-pole cable. One end is inserted into the socket of the booster the other end has to be re-wired since the ECoS sockets are not compatible.

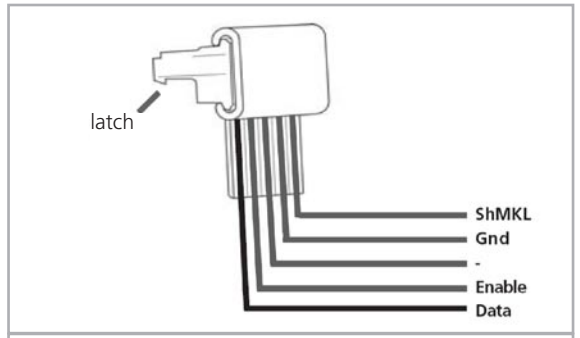

Figure 24

The contact pins are wired as follows:

1 = Data	(wire 1 of 6017-cable)
2 = Gnd	(wire 4 of 6017-cable)
3 = *not used*	
4 = ShMKL	(wire 5 of 6017-cable)
5 = Enable	(wire 2 of 6017-cable)

Cut off the plug of the 6017-cable and connect the individual wires to the ECoS booster output as described above.

Make sure all wires are connected correctly to avoid damage to the booster and / or the ECoS.

The other end of the cable must be wired to the socket of the 6017 resp. 6015 booster. The plugs will only fit into the correct sockets dedicated for the particular device. Other boosters are to be connected to the first one according to the instructions given in the booster manuals.

With a Märklin® - booster you cannot run locomotives operating with the Selectrix® data format nor is it possible to automatically detect M4 locomotives.

The boundary from the district powered by the ECoS and the other districts powered by 6017 - boosters must be equipped with a rocker set (HO only) in addition to isolating the centre rail. The Märklin® part numbers are Märklin® No. 204595 for the C - track system and Märklin® No. 385580 for the K - track system.

For larger layouts in scale 1 we strongly recommend our ESU ECoSBoost 8A booster, ESU part No. 50011.

8.7.2.3. Configuring the short circuit switch off

After wiring your booster you have to configure the software in order to assure correct functionality of the short circuit protection. Chapter 21.3.1 provides more details.

8.7.3. ECoSBoost wired to ECoSlink bus interface

We recommend to connect an ESU ECoSBoost 50010 (4A option) resp. 50011 (8A option): These boosters can generate all four data formats and due to the M4 and RailCom® feedback features M4 locomotives can be automatically detected. Wiring these devices is quite easy. Simply hook up the bus cable provided with one of the ECoSlink Connect sockets.

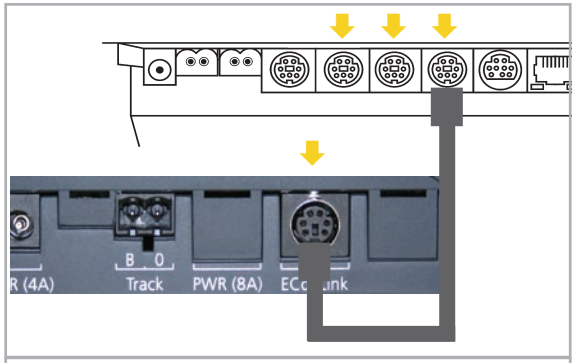

Figure 25

You will find more information about our ECoSBoost boosters in the user manual for the boosters.

8.8. ECoSniffer input (Description 8.8.3)

8.8.1. Wiring Märklin® 6021

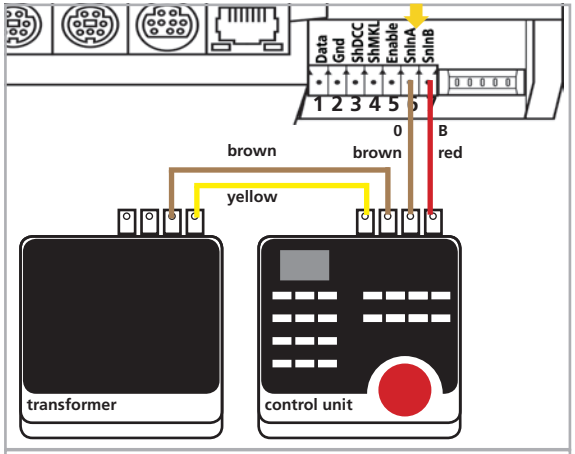

Figure 26

8.8.2. Wiring a Roco® Locomouse®

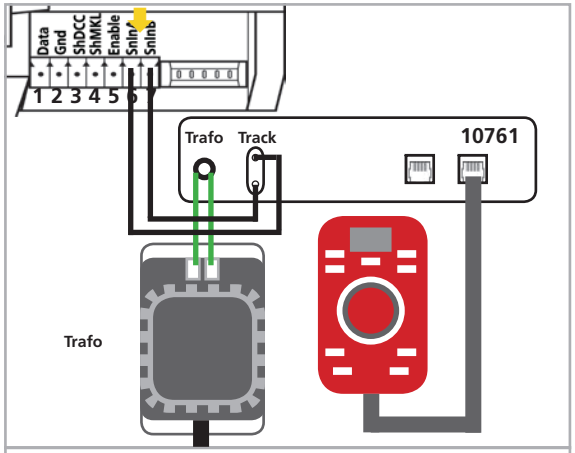

Figure 27

8.8.3 Description ECoSniffer input

The ECoSniffer input (SnInA and SnInB of the booster / ECoSniffer socket) contacts have to be connected to the track output of your old system. Polarity is not an issue. The old system continues to get its power through the old power supply.

Make sure that the old system does not have any connection to the tracks. All tracks must be supplied with power through ECoS. The power outputs of two or more digital systems may never be connected to the tracks simultaneously.

Input voltage: 14V to 30 V

Data signals: DCC or Motorola®, auto-detect; NO SX®

Detailed information regarding the exact function of ECoSniffer is provided in chapter 19.

8.9. s88-Input

An s88-system consists of up to 32 s88-mocules that are connected in series. The first module (module 1) is connected to the s88-socket of ECoS while module 2 is wired to module 1, etc. Thus we build up a bus –system. All modules will be numbered within ECoS according to the place in the chain of connected modules.

Each s88-module is supplied with one cable. The polarity is defined since the plug only fits in one position into the socket.

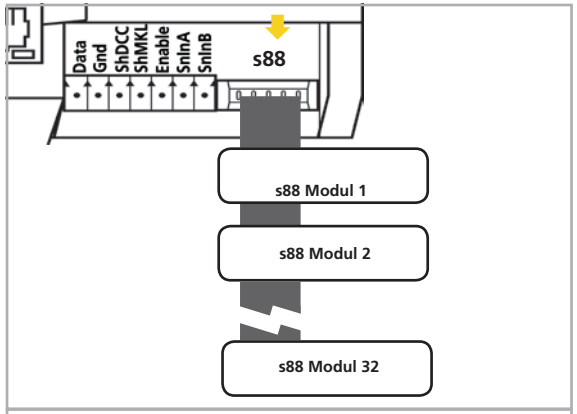

Figure 28

All s88-modules are normally supplied with power by ECoS. In total the s88-input can supply 750mA. Should this be in sufficient you may use s88-modules suitable for an external power supply. Please refer to the manual of your s88-modules.

The s88-input of ECoS is galvanically isolated from the rest of the layout and the command station. Therefore there is no direct ground connection between ECoS and the feedback decoders.

The ground terminal of the first module must be connected to the ground pole of the tracks (brown).

However, the ground terminals of the 6017 boosters and the s88 modules are linked on the track terminals. This is necessary in order to operate the s88 modules.

ECoS was tested with the following s88-modules:

- Märklin® 6088
- LDT RM-DEC-88
- LDT RM-GB-8
- Viessmann 5217

Before you can use the feedback contacts you must configure the s88-bus. You will find details in chapter 22.

9. Initialisation & Control

9.1. Start up

There is no dedicated switch-on button. As soon as you connect the power pack (transformer) to the mains, the ECoS will start initialisation.

Depending on the software version and the number of locomotives and accessories this process – also known as booting – may take up to two minutes. During this time the ECoS displays different images while the background illumination may flicker occasionally or even vanish altogether. This is quite normal and no reason for concern.

At the end of this process the "Go" button lights up in green.

9.2. Switching off

There are two possibilities to switch off the ECoS:

- Simply pull the mains plug from the power outlet. Provided batteries are inserted and charged to a reasonable level the ECoS will save the stored data and then turn itself off. As long as the "Stop" button is lit (red) the ECoS has not been fully turned off. This simple method has the disadvantage that if there are no batteries or if they have been incorrectly inserted or simply have been discharged to a low level then data may get lost. Therefore we do not recommend this method.
- When you press the "Stop" button and keep it held down then a controlled shutdown process will start after about 3 seconds. The command station saves the current operating status and signals the end of operations to all boosters and other external devices and shuts down. As soon as the following images are displayed on the screen you may turn off your command station (pull the mains plug).

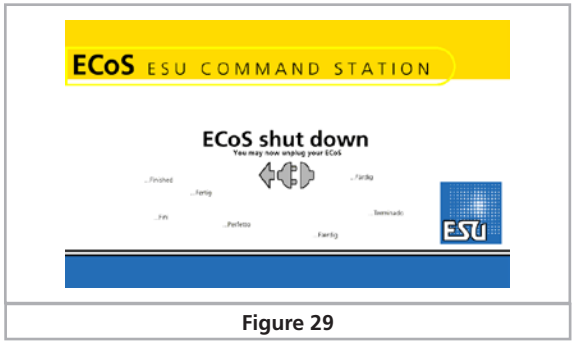

Figure 29

Unplug the mains cable once these images are displayed and the STOP button starts blinking. If you remove the mains plug to soon then certain data may be lost (similar to discharged batteries).

9.2. Stop-button

After briefly pushing the „Stop" button ECoS will immediately interrupt the track current and all external boosters. The display shows „Emergency Stop", the red Stop button is lit. Use the Stop button in case of danger or when you place or remove a loco on or from the tracks.
ECoS will also switch to „Emergency Stop" in case of overload or short circuit: the display will show the symbol for „Short Circuit" at both lower corners.

9.3. Go-button

The Go-button releases the „Emergency Stop". The green "Go" button is lit. Now the track voltage is available again at the output terminals. The internal and the external boosters are re-activated. Operation may continue.

If ECoS switches in „Emergency Stop" again (the red LED of the stop button is lit) there is most likely a short circuit on the layout. This has to be found and removed before operations can continue.

If the "Go" button blinks green then at least one ECoSBoost booster in the system has been shut down due to a short circuit. In this case you should try and identify the ECoSBoost booster concerned. The current monitor (see chapter 23) can assist you in this process.

9.4. Screen saver

In order to prolong the life of the background lighting the command station is equipped with a screen saver. The screen will slowly get darker after four minutes since the last command has been entered. After 10 minutes the background lighting will be completely turned off.

As soon as you press any key or touch a screen button the background lighting will be turned on again.

The operation of the command station is not influenced by this feature. The screen saver cannot be turned off.

10. Introduction to operations

Any commands are given graphically by using the touch screen. All commands are directly given via the screen. The display on the screen changes accordingly subject to which menue is currently open.

10.1. Joysticks

The four-way joy stick with the "Centre click" function serves to navigate through the menus, for selecting a locomotive or triggering the whistle („Playable Whistle") of locomotives suitable equipped. Never use force when handling the joystick.

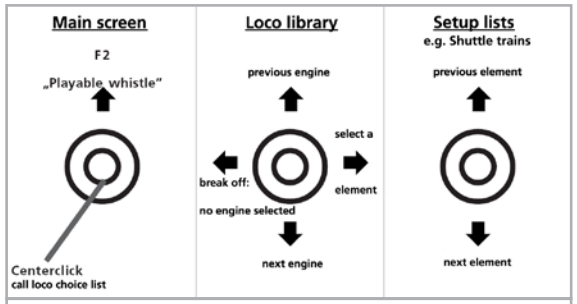

Figure 30

- In the locomotive choice list you can move up and down in the list by moving the joystick and select a locomotive by pressing it once again (alternately you can move the joystick to the right). By moving it to the left you can cancel the selection.
- In fact, you can move up and down in any menu by moving the joystick. Moving it to the right or pressing it down selects an element, moving it to the left exits the menu.
- Moving the joystick upwards on the locomotive control screen (cab window) - without any menus being open – triggers the function F2. In conjunction with the LokSound decoder V3.5 you can influence the frequency (the pitch) of the whistle as well as its volume: the more you push the joystick upwards the louder the whistle. At last you can blow the whistle like the engineers of prototype railroads!

10.2. Keyboard

There are 9 function buttons for each cab. They are sorted from

Figure 31

top to bottom: At the top is the lighting button (F0) followed by F1 through F8. These buttons control the functions of the locomotive currently controlled by this cab. The integral LED of each button indicates the current status.

10.3. Main menue - Display mode

At the top of the main menu you can see four fields. You can directly touch them in order to select the desired display:

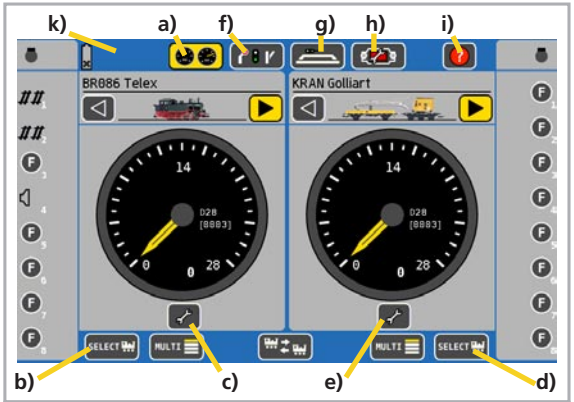

Figure 32

10.3.1. Operational mode (running locomotives)

a) In this mode you have access to locomotive control. Each cab can either run one locomotive (full screen display) or 5 locomotives (multi cab display).

b) Selecting a locomotive on the left: opens the locomotive selection window for the left cab. Alternately you can press the left locomotive selection button.

c) Locomotive menu left: opens the menu for changing settings of the locomotive currently assigned to the left cab.

d) Selecting a locomotive on the right: as described in b), for the right hand cab

e) Locomotive menu right: as described in c), for the right hand cab

10.3.2. Turnout control panels

f) Turnout control panel: touching the appropriate symbol calls up the turnout control panel for controlling accessories. You may continue to run your locomotives while the turnout control panel is active.

10.3.3. Turnout control panels and track diagrams

g) Turnout control panels and track diagrams: In this mode you can switch accessories and routes on several panels corresponding to the real layout track configuration.

10.3.4. Set-up

h) Set-up menu: this opens the general set-up menu. Here you can adjust all general settings such as brightness and contrast of the screen or "Out-and-back" operations. You can also configure your ECoSlink devices and the booster current threshold.

10.3.5. Help

i) Help menu: Context sensitive help directly on the screen makes getting to know your ECoS very easy and gets you out of trouble should get stuck.

10.3.6. Status line

k) Status line: Here any faults or other remarks will be displayed:

Low Batt: No batteries inserted or voltage is too low. Shut down your command station as described in chapter 9.2 by using the "Stop" button and replace the batteries with new ones.

Emergency stop: Track voltage is switched off manually, "Stop" button lights up in red.

Short circuit: The track voltage has been switched off due to a short circuit or overload, the "Stop" button lights up in red.

Update: An internal software update is under way. Operations can only continue once the update has been completed. Under certain circumstances this could take up to 10 minutes.

10.4. Switch buttons

Switch buttons („fields") serve to confirm certain actions. You may activate them with your finger or the stylus.

This button confirms an action. Changes will be accepted and saved.

This button cancels an action. Changes will not be saved.

10.5. Data entry fields

This symbol opens the virtual keyboard for entering text. The current text is displayed in a data entry field.

For entering or editing text first select the choice field resulting in the display of a cursor at the end of the line. Now you can enter text and / or numbers with the aid of the displayed keyboard.

Deletes the last character

Deletes all lines

If several fields exist, only the one that has been activated by touching it is active. You recognise this by the frame (interrupted line) around the text.

10.6. Choice lists

Choice lists allow you to select something out of a list of possible options.

Opens a list with possible options.

Confirm the desired option with your finger or the stylus.

Figure 33

10.7. Slide controller

Slide controllers make it easy to set numerical values.

Increases the current value (alternately: move joystick upwards)

Reduces the current value (alternatively: move joystick downwards)

10.8. Radio buttons and choice fields

Radio buttons enable you to make a choice out of a group of possibilities. Only one entry can be active at any given time similar to the pre-selection buttons of a radio tuner.

Choice fields serve for confirmation of options in ECoS. A tick shows an active option.

11. Run locomotives

ECoS stores a list of locos in which you have entered all locos that you want to run on your layout. Any loco without an entry in this list cannot be operated. Therefore these data have to be entered once at the beginning

Entering a locomotive in the locomotive list is either happening fully automatically (M4 locomotives) or manually supported by a comfortable menu technique. The entries can be extended, changed or deleted. These entries are not only needed for the ECoS but also for all peripheral devices either connected directly to the ECoS or via other devices.

The maximum number of entries in the locomotive list is 16348 locomotives and thus far exceeds any realistically needed number.

11.1. Adding new locomotives

There are several possibilities for entering new locomotives:

- Automatic detection and registration of M4 locomotives
- Selecting Märklin® locomotives form the internal locomotive data base
- Entering locomotives manually

Which method you choose is up to your personal preferences.

11.1.1. Entering M4 locomotives

Märklin® mfx® locomotives resp. locomotives with ESU M4 decoders will generally register themselves. Simply place the locomotive on a track of your layout. Please make sure that the layout is powered (the green "Go" button is lit). The locomotive must not be located in an area where the power may be turned of occasionally (e.g. signal stop section or similar, booster connected to the external booster interface).

Subject to the type of decoder the transmission of data from an M4 decoder to the command station takes about one minute. If the locomotive is being placed on the layout during operations for the very first time then this process may take up to 3 minutes.

During this registration process the progress is indicated by a progress bar in the status field at the top left of the screen.

Once the bar completely fills the symbol you can assign the locomotive to either cab by pressing one of the two M4 symbols (left or right). The locomotive has also been entered into the internal locomotive list automatically.

Figure 34

M4 locomotives are always registered one after the other. The sequence of registration depends on the internal serial number of the decoder (the so called "mfx®-ID"). Any additional locomotive can only be registered once registration of the first locomotive has been completed.

We recommend placing new locomotives on the layout one at a time. If there are several new locomotives on the layout then the registration process may be unnecessarily delayed.

11.1.1.1. Hints for save registration of mfx® locomotives

Always make sure that the following is adhered to during the entire registration process:

- The locomotive must not be in a district powered by a 6017 booster or any other type of booster that is not M4 capable.
- The locomotive is not placed in automatically controlled blocks.
- The locomotive is not placed in stop sections.
- The locomotive is not placed in brake sections or districts powered by brake boosters.
- The wiring of your layout is in excellent condition. Track feeder points (B) and (0) should be located every 1.5m to 2.0m, particularly before and behind turnouts.
- Do not use multi-core or twisted cables (e.g. post office cables, etc.) for wiring the ECoS to the layout. In twisted cables the feedback signals may be distorted.
- Keep the cables between command station and layout as short as possible and make sure that they are of sufficient wire gauge (for cable lengths of more than 5m the minimum cross section should be 1.5mm²). Stranded wires with 0.14mm² are totally unsuitable for track feeders and are a frequent cause of malfunctions for M4 registrations.
- Do not place the power cables from the boosters to the different layout districts parallel to each other. This may lead to an unintended signal cross-over of the mfx® signals.
- Remove all M track turnout signals whose light bulbs are directly powered from the track and check all car lighting: interior lighting with capacitors (without recharging circuitry) are "reliable feedback killers". Use interior lighting sets with rectifiers and preferably with LED technology, for instance from ESU. Please press the STOP button before you put the loco on the tracks.

11.1.1.2. New registration of M4 locomotives

After the initial registration at the command station it may happen that the locomotive must register once again during operation. This could be due to the following reasons:

- An M4 locomotive that was not located in the appropriate district (not on the layout, signal stop section, district powered by a booster that is not feedback capable) has been manually deleted from the locomotive choice list.
- The decoder settings have been changed with the ESU LokProgrammer and then the locomotive was placed on the layout again.
- The locomotive has been operated with another M4 command station (e.g. ESU ECoS, Märklin® mobile station) and has now been returned to its "home layout".
- The locomotive with M4 decoder is located in a brake section or a stop section while another locomotive has been manually deleted from the locomotive choice list. Once the locomotive receives power again it will register anew.
- The locomotive decoder has been reset to the factory default values.

Under the following conditions all M4 locomotives will register again at the command station:

- If backup data have been downloaded onto the ECoS (compare to chapter 24.2.3.). In this case all M4 locomotives will register again in order to assure data verification between decoders and command station.
- The command station has undergone a factory reset (compare to chapter 21.1.4.). In this case all M4 locomotives will register anew.
- A (any) locomotive has been deleted from the locomotive list while the "Stop" button was pressed (that is when there was no track power available). After pressing the "Go" button all M4 locomotives will register anew in order to assure data verification between decoders and command station.

11.1.2. Entering Märklin® locomotives into the data base

The ECoS has an internal data base containing the factory data from most of the older Märklin® locomotives. Entering these locomotives is particularly easy. The following steps can be conducted either with the left or the right cab. Here we explain the procedure for the left cab.

Takes you to the locomotive menu.

Figure 35

The choice menu as per Figure 35 will open. The arrow next to the entry "New locomotive" indicates that sub menus will open whenever this line is selected. Choose the sub menu by clicking onto the corresponding text line on the screen.

- Select "New locomotive" and a sub menu opens.
- Select "From data base" and a menu with various entries of the integral data base opens.

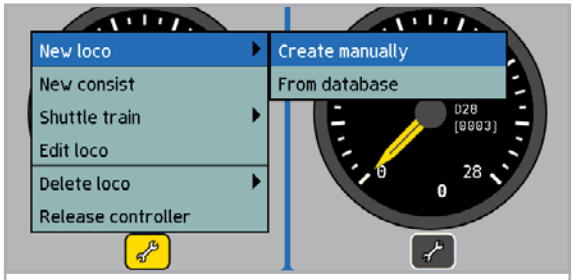

Figure 36

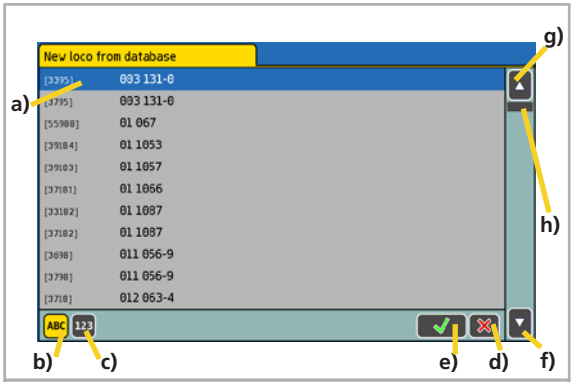

Figure 37

a) Selected locomotive
b) Sort by part number
c) Sort by name
d) Cancel without selecting a locomotive
e) Confirm selected locomotive and take over
f) One dataset downwards
g) One dataset upwards
h) Location indicator relative to the entire content

A dataset is selected by moving the choice bar a) upwards or downwards with the joystick and by pressing down the joystick to confirm the selection.

Alternatively one can navigate through the list by pressing the arrow keys f) or g) and confirm by pressing the screen button e).

The locomotives can either be sorted by Märklin® part numbers (screen button c) or by the proposed Märklin® name (screen button b)).

The name is often related to the locomotive class or a commonly known nick name of the prototype locomotive.

After selecting the dataset it will be directly assigned to the desired cab (left in our example) and the name, symbol and function buttons as suggested by Märklin® will be taken over. Of course, these parameters can be changed at any time as described in the following chapter.

The locomotive data base does not claim to be complete. Locomotives that are not contained in the database must be entered manually just like locomotives from other manufacturers. Of course the locomotives may not be reprogrammed in any way (e.g. change of address with the dip switches).

11.1.3. Manual registration & programming of locomotives

Takes you to the locomotive menu.

- Select the entry "New locomotive" and thereafter "Manual data entry" in the sub menu. A dialog window opens where you can enter the parameters of your locomotive.

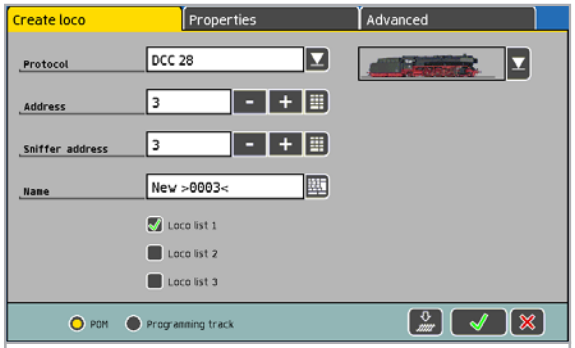

Figure 38

Registers your entries, closes the dialogue window and saves the locomotive in the locomotive choice list. The locomotive is also assigned to the cab.

Discards the entries. No new locomotive is being registered.

11.1.3.1. Data format

Via this choice list you set the data format for this particular loco. ECoS does not check if the loco understands the selected protocol. If in doubt read the decoder manual.

Please refer to chapter 7.1.1. in order to choose the correct data format for your model. Subject to the settings of the parameters you may experience far better results.

11.1.3.2. Address

Here you enter the current address of the loco. The accepted address range is subject to the data format and may be restricted. The locomotive is actually operated with this address at the track output.

Older Märklin® locomotives with Delta or 6090 decoder only accept addresses 1 - 80. Some newer Märklin® decoders also accept the range up to 255. You do not have to enter addresses as two-digit address (like with the Control Unit 6021).

Increases the address *(hold and press the button to clock up)*

Lowers the address *(hold and press the button to clock down)*

Calls up a keyboard for manual entry of the address.

11.1.3.3. Sniffer address

The address entered here is for the ECoSniffer. You can learn more about it in chapter 19. If you have not connected any old devices to the ECoSniffer you may leave address „0" unchanged.

11.1.3.4. Name

You can assign a name with up to 16 characters to any loco at any time. This name appears on the main screen whenever you have called up this loco and also in the choice list of locos. Be creative and address your locos by name only in future!

The name >xxxx< is set as the default value (xxxx corresponds with the address).

Locomotive names may be assigned several times. There is no control feature checking if a name exists already.

Press the keyboard symbol.

Figure 39

Now you can delete the preset locomotive name and replace it with the desired name.

11.1.3.5. Symbol

In this choice list you can select a matching symbol for the new locomotive to be entered. The symbol has no influence on operations it only serves for quick visual recognition and differentiation of your locos. This feature is quite useful later on when you are searching for a certain locomotive.

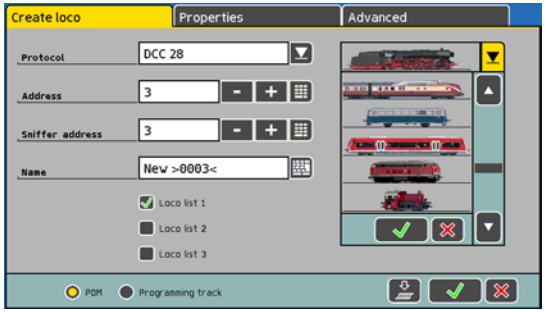

Figure 40

The command station identifies different types of locomotives by this symbol and thus differentiates between steam, diesel and electric locomotives. This feature is quite useful later on when you are searching for a certain locomotive.

11.1.3.6. Favourite lists

In order to quickly find certain locomotives in a large number of rolling stock there are 3 locomotive choice lists in which you may store your locomotives.

In order to add a locomotive to one of these lists simply tick the field for the desired list.

As an example the following classification of locomotives would be useful:

Freight train locomotives	List 1
Passenger train locomotives	List 2
MUs	List 3

Later you can first select the appropriate locomotive list when searching a particular locomotive.

11.1.3.7. Function mapping

The ECoS enables you to freely assign symbols to each function button. Besides assigning a symbol you can also determine for each function if it should operate as a momentary or a continuous output.

- Select „properties" in the locomotive menue and choose the symbol on the left in order to call up function mapping.

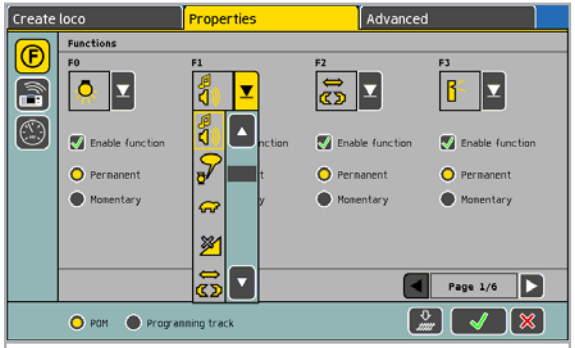

Figure 41

- Select the desired symbol for each function from the list.
- Set the function to momentary or a continuous output. Momentary functions remain on as long as you press the corresponding function button. Continuous outputs remain on until you touch the function button once more.
- If you do not want to use a certain function screen button simply remove the tick next to the field "Utilising this function".

The ECoS does not check if a symbol matches the type of locomotive. The pictogram only serves for easier identification on the display.

In order to transmit changes to M4 locomotives they must be connected to the ECoS during this process.

DCC locomotives can switch up to 20 functions; M4 decoders up to 16 and Selectrix® decoders regrettably only two.

Locomotives operating in "Motorola®14" and „Motorola®28" mode offer up to 9 functions. The ECoS automatically assigns functions 5 - 8 onto the second Motorola® address. This feature is offered by all LokSound decoders. In order to work it has to be activated first. Refer to the decoder manual to find out how to accomplish this.

11.1.3.8. Assigning functions with the ECoSControl Radio

You can assign a symbol for each locomotive which then will be displayed on the ECoSControl Radio. Since the display of the handheld controller can only handle a limited number of locomotive symbols you may have to make some compromises.

- Select this symbol on the left in order to call up the menu for assigning symbols on the handheld controller.
- Choose the desired symbol.

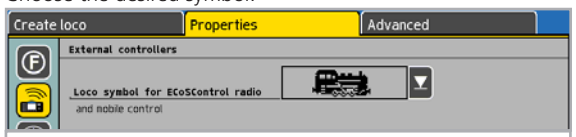

Figure 42

11.1.3.9. Speed steps / max speed display

Select this symbol in order to call up the settings of the speedometer. There you can select if you want to display speed steps or speed (in km/h) on the speedometer.

Figure 43

- In the „Speed Step"-mode ECoS shows the currently set speed step. This is represented in the following ranges: 0 – 14, 0 – 27, 0 – 31 resp. 0 – 126. This is subject to the protocol used.
- In the „Speed"-mode ECoS calculates a speed in km/h that is then displayed on the screen.

In order to be able to display the correct speed you have to enter the desired maximum speed of the particular loco in km/h. This should be the maximum speed of the prototype and not of the model.

The value that you select with the slide controller will be displayed at the highest speed step. All values in between will be interpolated accordingly.

The value entered here only serves for the display and has no influence on the actual speed of the loco. No parameters of the loco will be changed by this!

Setting the maximum speed has to be done via CVs in DCC decoders; in Märklin® locos this generally has to be adjusted within the loco.

11.1.3.10. Direct changing of address and speed step settings

Whenever you enter a new loco the data is only entered in ECoS without any changes to the decoder in the loco.

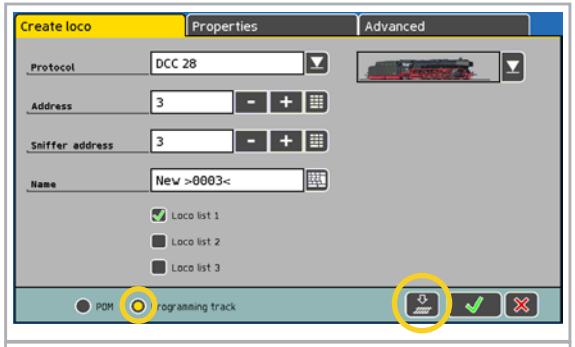

Figure 44

Often it happens that the address of a loco is not known. If so desired you can program the loco when entering into ECoS provided it is a DCC loco:

- Place the loco on the programming track
- Select the option „Programming on programming track" (Fig. 44).
- Push the programming icon. ECoS will now program the following parameters:
- The address in CV1 resp. CV 17 / 18 provided a long address has been selected.
- In CV29 the use of long or short addresses and the number of speed steps is set (14 resp. 28 / 128 speed steps).

11.1.3.11. Extended decoder settings

The function of this tab is explained later in chapter 18 „Programming Decoders".

11.1.4. Indirect entry of a locomotive

Sometimes you may want to place a loco on the tracks and run it without time-consuming data entry. Of course, this is also possible with ECoS.

- Select the loco choice button of the throttle that you want to use.

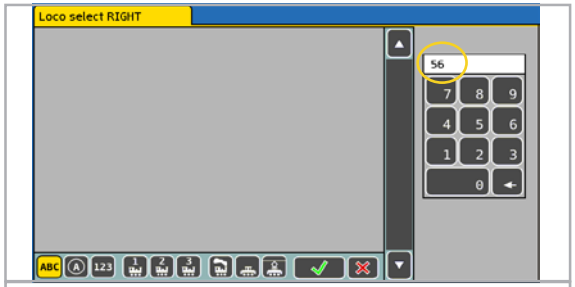

Figure 45

- Type in the address using the number block.
- Confirm your selection

If there is no other loco with the same address registered ECoS will automatically enter the necessary data in the background with the given address and the name „New>xxxx<" and by setting the Motorola®28-protocol.

Which protocol ECoS should use whenever you enter a loco directly can be pre-set in the menue. You find details in chapter 21.5.1.

11.2. Call up a locomotive with the cab

You can either assign one locomotive each to each cab or work with the multi cab display.

Press the locomotive-screen button of the desired cab. Alternately you may also press the locomotive selection button.

A list containing all registered locomotives will open:

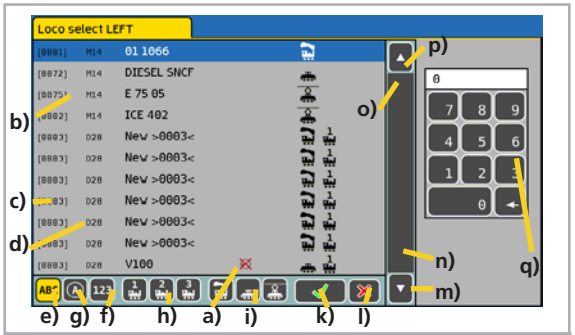

Figure 46

a) Locomotive is run by the other cab; therefore it cannot be operated with this cab
b) Marked locomotive
c) Locomotive adddress (in case of M4 locomotives "M4" will be displayed)
d) Data format of the locomotive (empty in case of M4 locomotives)
e) Sort locomotive list by name
f) Sort locomotive list by address
g) Sort locomotive list by active locomotives
h) Sort locomotive list by going through locomotive list 1, 2 or 3
i) Sort locomotive list by type of locomotive (steam, diesel, electric)
k) Select marked locomotive
l) Cancel without selecting a locomotive
m) One element down
n) Move list downwards
o) Move list upwards
p) One element up
q) Number field for numeric selection

You can fade in additional pictograms for each loco:

Active loco: this loco is running

Loco is blocked: this loc is run from another throttle

You can now navigate the list either with the joystick or with the stylus until you have found the desired loco. Alternately you can type in the loco address. ECoS scrolls automatically to the corresponding address within the list. After confirming the loco it will be called up by a throttle.

11.2.1. Swapping the cabs

Touch this symbol for swapping the currently active locomotives: the left locomotive will be handed over to the right cab and vice versa.

11.2.2. Clearing a cab

Sometimes one does not want to have any locomotive assigned to a cab. Of course this is also possible.

- Call up the locomotive menu of the cab which you want to clear.
- Select "Clear cab".

11.3. Speedometer display options

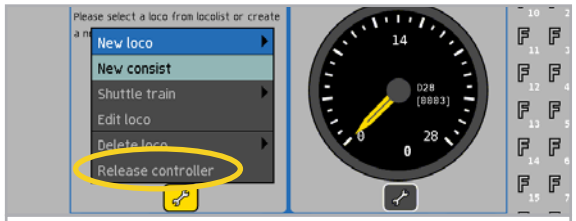

Figure 47

After selection the loco speed is displayed on the speedometer. Besides the information mentioned in chapter 6.3 the speedometer shows further important data.

a) Data protocol of loco
b) Address of loco
c) Current speed step resp. speed of locomotive

Subject to the status of the loco the following symbols can be displayed:

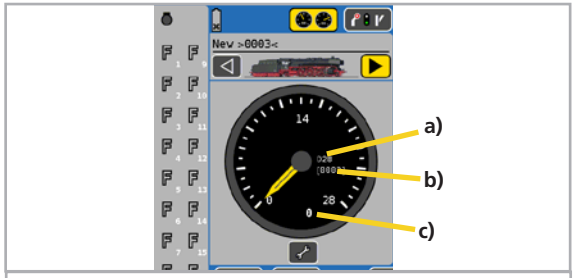

Figure 48

Symbol „Conflict of Address" (see chapter 11.9.1)
Symbol „Loco is blocked" (see chapter 11.9.2)
Symbol „Shuttle Train Mode" (see chapter 17)
Symbol „Consist" (see chapter 12)

11.4. Deleting a locomotive

You can delete any loco at any time should you not need them any more. First select the loco and assign it to a throttle.

- Select the loco menue of the appropriate throttle and select „Delete Loco" in the menue. Then another menue opens.
- Select „Delete" and the loco will be deleted.

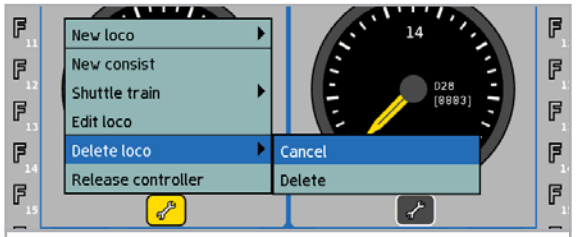

Figure 49

11.5. Multi cab display

If you wish you can run up to 5 locomotives with each cab simply touch the appropriate screen button in order to toggle between these 5 locomotives.

- Make sure the command station is in train control mode.
- Call up the multi cab window by touching the input field below the speedometer.

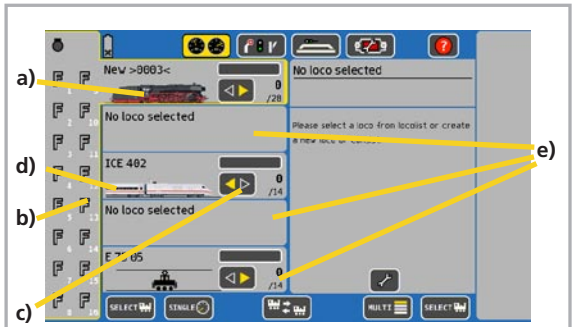

Figure 50

a) Currently active locomotive controlled by this cab. (You can recognise it by its open frame).
b) Function button symbols of the currently active locomotive.

c) Speed direction indicator of the currently active locomotive. Is a locomotive already controlled by another cab the arrow indicating direction is shaded grey. Normally this arrow is green.
d) None active locomotive.
e) Empty fields for displaying other locomotives.
f) Toggling between single cab and multiple cab modes

You may assign a locomotive to each field:

- Click onto the field to which you would like to assign a locomotive. It is immaterial if the field is empty or not.
- Call up the locomotive choice screen button and select the desired locomotive as shown in chapter 11.2.

Simply click onto the field that displays the locomotive that you want to control with this cab.

In the multi cab window the locomotive menu for adjusting parameters cannot be opened. If you wish to adjust any parameters first select the locomotive and then go to the single cab mode.

11.8. Adjusting locomotive parameters

You can change any of the locomotive parameters at any time should you wish to do so. First call up the desired locomotive on one of the cabs.

Call up the locomotive menu. Select "Edit locomotive" in the menu. All following steps are described in chapter 11.1.

The field "Edit locomotive" is shaded grey and is not available if:

- Another user is running this locomotive. Only locomotives that are listed for this cab can be edited. Read chapter 11.9.2 for more details.
- Access control prevents editing locomotives. Read chapter 21.4 for more details.
- The locomotive is run by the automatic shuttle train mode. Chapter 17 provides details.

11.9. Interesting information on how to run a loco

11.9.1. Conflicts of addresses

A conflict of addresses occurs if you want to run a loco but another loco with the same address is already running.

Each locomotive should have its own unique address. That way there will be no problems during operation. In practice it happens frequently that two or more locos are listed in ECoS and have the same address: collectors often own several locos of the same class and to whom they have assigned the same address; e.g. class 44 with address"44". Of course, normally only one of the models will be put on the layout while the others remain in a display case. However, the owner of these models wants to list all of them in the list of locomotives in ECoS.

At first this can easily be achieved. ECoS permits you to enter as many locos with the same address as you wish.

However, it is not possible to run them at the same time on your layout. The first loco can be run in the normal way. When the second loco with the same address is selected the symbol shown on the left will be displayed and this loco cannot be operated. In reality this would make no sense at all. As soon as a command is transmitted to the first loco both locos would respond – after all, they have the same address!

The same occurs if you enter the following locos:

- Loco1: Address: 03, DCC 28 speed steps, „E 103"
- Loco2: Address: 03, Motorola®14 speed steps, „BR 03"

In this case the display would also show a conflict of addresses since both locos have the address „03". The differing data format does not have any impact, because ECoS cannot know if a modern multi-protocol-decoder (e.g. LokSound) will respond to both formats.

In practice assigning the same address to two different locomotives is often the cause for operational disruptions that seem to be unexplainable at first glance. We strongly recommend assigning a dedicated address to each locomotive.

11.9.2. „Locking" - Exclusive access to locomotives

ECoS only permits one throttle to run a certain locomotive at any point in time. As soon as a cab runs a loco or consist the same loco can be selected on another controller but it cannot actually be operated. The inferior controller indicates this with the symbol shown here.

This setting is ideal for club layouts or display layouts where it is intended to give control to individual controllers over certain objects. „Taking Over" a loco from another controller is not wanted.

When you often run your trains alone but have located several handheld throttles around your layout it is useful to „hand over" a loco form one throttle to the next. ECoS offers a setting for this that we call „Taking Over Locomotives". Chapter 21.2 explains how it works.

11.9.3. Address ranges – recommendations

If you want to run vehicles multi-protocol-operation with Märklin®, ESU LokPilot, ESU M4 und DCC-decoders simultaneously we recommend to arrange for a split of addresses as follows:

Märklin®-decoders: Addresses 01 – 80

DCC-decoders: short addresses: Addresses 81 - 99

DCC-decoders: long addresses: Addresses > 256

With this method you make sure that no address is assigned to two different locomotives and that the available addresses can be optimally utilised.

12. Operating consists

Consists also get an address in ECoS like locos. They are listed and run in the same way as single locomotives.

12.1. Add a new consist

Select the loco menue of the left or right hand throttle and select „New Consist".

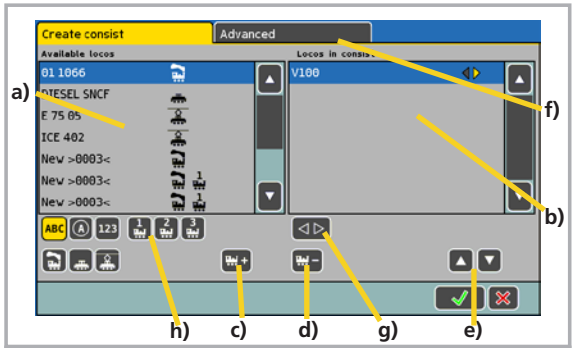

Figure 51

a) List of all locos
b) List of locos in this consist
c) Adds another loco to a consist
d) Deletes a loco from a consist
e) Moves the currently marked loco at the right up or down
f) Extended settings for consists
g) Chooses the desired direction of travel of the locomotive marked in the right list
h) Sort and filter options for the left locomotive list

- Select the first loco to be added to the consist from the list on the left.
- Touch the icon in order to add this loco. First touch the screen button "Clear cab" (also refer to chapter 11.2.2.) if you wish to add the locomotive that was run most recently into the consist. Then the locomotive is not active any longer and can be added to a consist.
- Use the same procedure with the other locomotives you wish to add to the consist.

  In the sub menu "Extended" you may select a symbol representing this particular consist as well as a name for picking this consist from the locomotive list.
- By touching this screen button the consist is established and assigned to the throttle.

  Consists are always run with 128 speed steps on the throttle. Internally ECoS will convert these speed steps to the appropriate value for each decoder.
- Locos can only be assigned to one consist.
- Consists cannot be added to other consists.

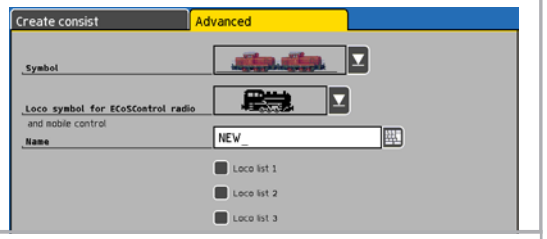

Figure 52

- Locos assigned to a consist cannot be run individually any more.

12.2. Assigning a consist to a throttle
Selecting a consist is done the same way as selecting a locomotive. Refer to chapter 11.2. Consists are marked as „Multi" in the locomotive list.

12.3. Change parameters of consists
You can change any settings in a consist just as easily as with individual locos, refer to chapter 11.8.

12.4. Deleting a consist
You can delete a consist just as easily as with individual locos, refer to chapter 11.4.

Any locos that were part of the deleted consist will of course not be deleted as well. They remain as individual locos in the list of locos.

12.5. Hints for running consists

- It is recommended only to add locos to a consist that process the information regarding direction (e.g.: Motorola® II-format; DCC-format).
- The characteristics of the locos in a consist should be similar (maximum speed, acceleration and deceleration). There should not be any big deviations. If necessary reprogram such locos before adding them to a consist. Also refer to chapter 18.
- Do not couple lightweight vehicles between locos in consists because of risk of derailment
- Please make sure that any isolated sections ahead of signals are sufficiently long (at least 36cm to 54cm longer than the consist) when running consists.
- The first locomotive in the consist determines the mode of the function buttons. You may adjust this for M4 locomotives. Thus it is possible to adapt running characteristics and function mapping.
- Should you wish to run a Märklin® sound car (e.g. 49962 or 49964) together with a locomotive you should locate the sound car as the first vehicle of the consist. It then determines the function mapping.

13. Switching accessories

Accessories are listed in a library within ECoS similar to locomotives. Thus all accessories have to be entered once before they can be switched. For switching the accessories will be assigned to one or several control panels. Normally this happens when you enter the accessory.

Accessories can be switched with the ECoS only if they are wired to an appropriate decoder. Typical decoders are Märklin® k83 resp. K84 or ESU SwitchPilot decoders.

13.1. Enter new accessories

- Open the turnout control panel by clicking onto the appropriate symbol in the main menu.
- Touch the configuration symbol and the configuration window will be displayed. There are pictograms at the bottom of the screen for all important functions.

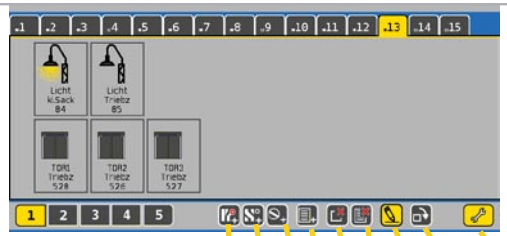

Figure 53

a) New accessory
b) New route
c) New turntable
d) New link
e) Delete link
f) Delete link and accessory
g) Edit accessory / route / turntable
h) Turn symbol by 90° to the right
i) Exit configuration mode.

- Click onto this symbol in order to enter a new accessory. The display of the turnout control panel changes to the "grid mode". Click onto the field where you want to locate the new accessory. The following configuration dialogue opens:

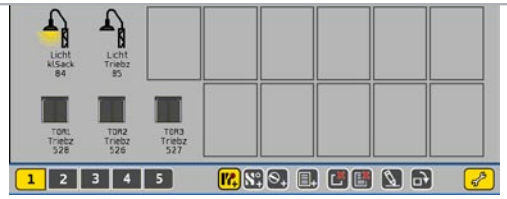

Figure 54

Figure 55

13.1.1. Data format
Here you can select the suitable data format to operate your accessory. DCC, DCC with RailCom® and Motorola® are available.

13.1.2. Name
For a precise representation on the screen you may give your accessory a name of up to 3 lines with 9 characters each. The number depends on the width of the letters and varies between 5 and 9 characters.

13.1.3. Number
Enter the number of the corresponding accessory here. You must enter this value numerically. Please make sure that you enter a correct number (matching the decoder setting) since this number is not be double checked by the system.

The corresponding accessory address and output number will be displayed in parenthesis behind the number. In the example as per Figure 53 "[3:2]" indicates that this is the second output of the third decoder.

13.1.4. Symbol
You should choose the symbol for your accessories as precisely as possible: ECoS recognises two-, three- and four-aspect symbols and controls through the symbol the outputs of the accessories accordingly; also refer to chapter 7.4.

ECoS offers a large number of German and international symbols in a choice list.

13.1.5. Permanent versus momentary action buttons
Here you determine if the accessory should be switched for a pre-determined time (=change over) or only as long as the button is pressed (=pulse).

Normally you would use the „change over" mode for turnouts. ECoS transmits a defined, time controlled pulse to the solenoid. Thus any burnout of solenoid coils is prevented.

The „Pulse" function is best suited for un-couplers, which should be active as long as the function is activated (until your finger leaves the screen button). Furthermore the desired decoder output can be selected by choosing "red" or "green".

The function mode cannot be changed later unless you delete the accessory and re-enter it.

13.1.6. Switching time

The switching time can be adjusted in five steps from 0.25 seconds to 2.5 seconds in „Change Over" mode.

Should the default value of 250msec not be sufficient for reliable switching increase the switching time step by step. Typical value: 250ms.

Once you have set this parameter touch the corresponding screen button and ECoS stores the setting and completes the configuration dialogue.

Should the dialogue not close as desired and instead an exclamation mark „!" appears just behind the three lines with the name, then the text is too long. ECoS checks the length of the text entry dynamically when it is saved. In that case please shorten the name of the accessory. In order to be able to switch the accessory you must exit the configuration mode by touching this symbol.

13.2. Setting accessory parameters

You may reset the parameters of an accessory at any time:

- Select the turnout control mode and click onto the configuration symbol
- Click onto this screen button and then select the desired accessory.

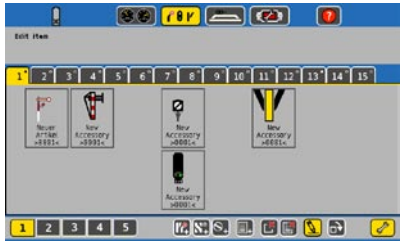

Figure 56

- All further steps are the same as described in chapter 13.1.

13.3. Creating a new link for an accessory (display on the turnout control panel)

You may create several links even on different turnout control panels. This is one of the main advantages of this concept. It allows you to locate accessories several times and group them in a logical manner.

The turnout control panel always displays the current status of all accessories. For that purpose the command station saves the status of each accessory. However, manual changes (by hand) of the aspect cannot be detected by the command station. Therefore you should assure that actual status and system status correspond with each other.

- First open the turnout control mode by clicking onto this symbol in the main menu line.

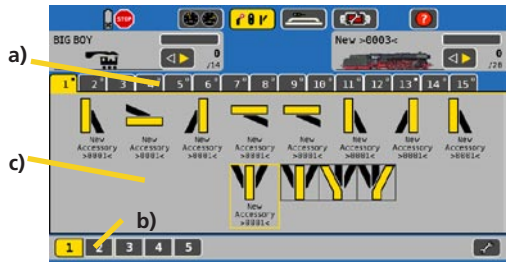

Figure 57

a) Choice buttons for the desired turnout control panel
b) Choice buttons for displaying the following 15 pages
c) Panel displaying 2 x 8 accessories

Each panel can display and control 16 accessories. A panel is called up by pressing the corresponding number.

13.3.1. New link

- Change into the configuration mode while in the turnout control mode.
- Press this symbol in order to create a new link. The available positions (empty fields) are indicated with a frame.

Figure 58

- Select the desired position for a new link and touch it. Then the menu "Select accessory" opens.
- Select from the accessory list the ones that you want to place here and confirm.

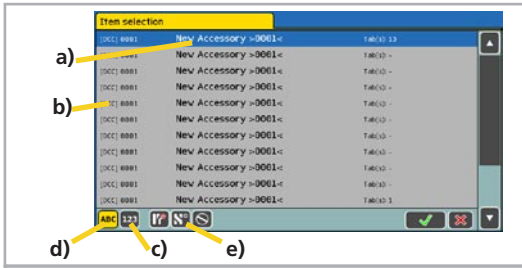

Figure 59

a) Name of accessory
b) Data format and address of accessory
c) Sort accessories by address
d) Sort accessories alphabetically
e) Filtering the selection: Display of accessories, routes or turntables.

13.3.2. Delete a link

If you wish to delete a link, go into the configuration mode while in the turnout control mode and touch the symbol "Delete link". All accessories will be marked with a frame.

Figure 60

- Select the accessory whose link you wish to delete. The link will then disappear.

This deletes only the link but not the accessory.

13.3.3. Turn a symbol

In order to enhance clarity you can turn the symbols to suit your needs. Select „Turn clockwise" in the menu and click onto the desired accessory which results in turning it clockwise by 90°.

13.4. Switch an accessory

An accessory can be switched very easily.

- Fade in the turnout control panel and select the desired panel.
- Push the pictogram of the desired article.
- Accessories with two definite positions: the alternate aspect or status will be switched on.

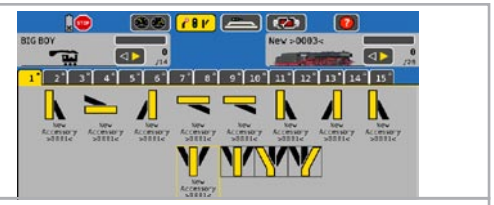

Figure 61

- Three- or four-aspect accessories: A window showing all possible aspects opens. Select the desired aspect. The window closes and the aspect will be switched on.

13.5. Delete an accessory

An accessory can easily be deleted:

- Open the turnout control mode and press the configuration symbol.
- Press this input field and all accessories will have a frame.

Figure 62

- Select the desired accessory and confirm your choice.

When an accessory is deleted it will be removed from all routes and links in the turnout control panel. So please check carefully if you really do not need this accessory any longer!

In some cases it may be necessary to display a list of all existing accessories. Such a list is contained in the set-up menu. Please refer to chapter 21.4.

14. Turntable control

The ECoS offers the possibility to control a turntable. Currently the following decoders are supported: Märklin® turntable 7286 with its decoder 7686 resp. compatible decoders or homemade devices with ESU LokPilot V3.0.

14.1. Connecting the turntable

No modifications are necessary on the turntable. Connect the turntable decoder with the turntable as described in the user manual.

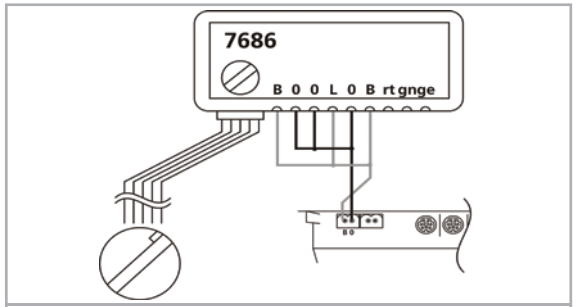

Figure 63

For the track power supply of the turntable you may either use the main track output of the ECoS (refer to Figure 63) or you may use an external transformer (refer to Figure 64).

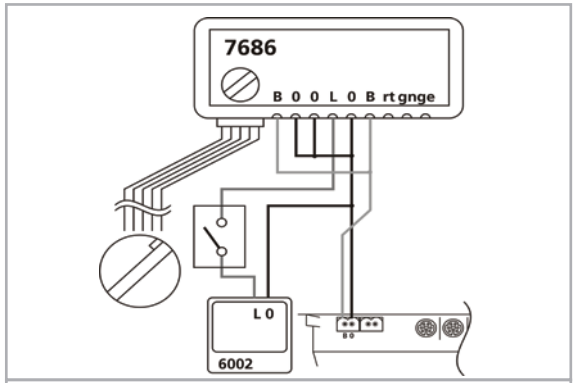

Figure 64

In case of using the track output of the ECoS the turntable will at first not respond to any commands.

It is also possible that the position of the turntable may be saved in the decoder erroneously if the command station is switched to "Stop" (manually or due to a short circuit) during operating the turntable. Therefore we strongly recommend using an external transformer.

14.2. Generating a new turntable

A new turntable can be created like a new accessory once you are in turnout control mode.

- Open the turnout control mode.
- Go to a completely empty panel (there may not be any links to other accessories!)
- Open the configuration mode.
- Select this symbol in order to create a new turntable. A grey frame will appear. Touch the panel at the location where the turntable should be displayed. Then the configuration dialogue for new turntables will open.

Figure 65

14.2.1. Type of turntable

Here you can select if the turntable will be operated with a Märklin® turntable decoder 7686 or with a LokPilot decoder.

Figure 66

14.2.2. Name

For an unmistakable display of the turntable you may allocate a name. There are 16 characters available.

14.2.3. Address

Here you enter the digital address of the decoder. In case of the Märklin® turntable decoder 7686 the address 225 must be selected which corresponds to the keyboard address 15. Should your Märklin® turntable decoder be set to the keyboard 14, then enter address 209.

If you use compatible, freely programmable turntable decoders by others then you are not limited to only two addresses per layout for the turntable.

14.2.4. Configuring tracks running off the turntable
When selecting the Märklin turntable decoder 7686 the track configuration will be displayed.

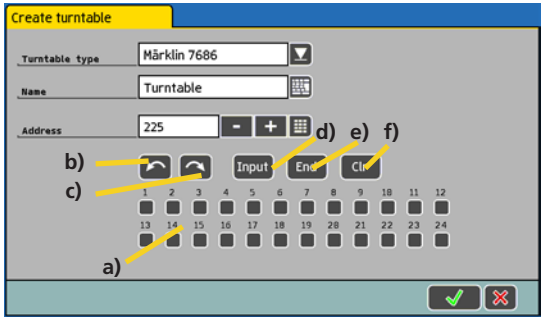

Figure 67

a) 24 choice boxes for the existing tracks
b) Step button "<"
c) Step button ">"
d) Programming button "Input": programming mode resp. data entry during programming
e) Programming button "End": saving data while programming
f) Programming button "Clr": deleting data while programming

With the aid of the 24 choice boxes a) you can define the actual tracks leading from the turntable.

The numbers of the tracks corresponds with the track numbers programmed in the decoder.

This definition is required in order to assure the correct representation of the current position of the turntable on the turnout control panel and must correspond with the programmed settings of the decoder. Otherwise this may result in misleading status indications.

The choice of the tracks leading from the turntable will not physically reprogram your decoder: the representation is initially independent of the actual decoder programming. It is important to align the graphic representation of the turntable position with the actual decoder settings.

14.3. Programming the turntable
The five screen buttons b) through f) correspond to the buttons as they are needed for programming the decoder with a Märklin® keyboard. The programming of the decoder must be done in the same manner as with the original Märklin® keyboard. Please also take note of the user manual of your turntable.

One can only start the programming mode of the turntable decoder 7686 within the first 5 seconds after turning on the power supply to the decoder by pressing the "Input" button. Any other button will prevent the access to the programming mode.

- If you connect the power supply of your turntable directly from the track output terminals as per Figure 61 then turn your command station to "Stop" and afterwards to "Go" again. If you now press the "Input" button within 5 seconds the turntable decoder will change over to the programming mode.
- If you connect the power supply of your turntable to an external transformer as shown in Figure 62 you can interrupt the power supply of the turntable decoder via this transformer respectively via an optional switch in the wiring from the transformer to the decoder (terminals L and 0). After turning on the power supply again, you must press the "Input" button within 5 seconds in order to switch the decoder into the programming mode.
- In the programming mode the internal track memory can be redefined. After pressing the "Input" button the turntable will automatically move to the position of track 1and emit an acoustic signal once it has reached that position. If another track should be number 1, then the turntable has to be turned step by step to the desired position with the aid of the step buttons ">" or "<". Pressing the "Clear" button will save the new position as track number 1 and simultaneously delete the previous track number 1.
- After that all other tracks will be entered in any sequence you choose. In order to accomplish this, the turntable has to be moved to the next position of track alignment (of either end of the turntable) with the aid of the step buttons ">" or "<". Save each track by pressing the "Input" button prior to moving the turntable to the next track.
- Once all available tracks have been recorded you may exit the programming mode by pressing the "End" button. This saves the entire turntable configuration and automatically numbers the sequence of all tracks clockwise starting from position 1.

Should any corrections or changes be needed at a later stage then the programming sequence starting from position 1 has to be repeated. The data storage remains intact even when the digital system is switched off.

14.4. Editing the turntable
You can open the configuration dialogue of an already programmed turntable via the menu "Edit accessories".

14.5. Deleting a turntable
Deleting an already linked turntable is done in the same manner as with any other accessory (also refer to chapter 13.5 of the manual).

14.6. Operating the turntable

The turntable can be controlled to move to any of the programmed tracks either by the step-by-step method or by preselecting the desired track number.

The programmed tracks are indicated as small circles on the display. The current position (track number) of the turntable is shown at the centre of the turntable display (refer to figure 68):

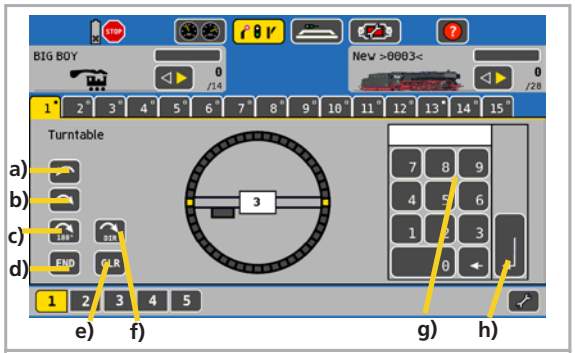

Figure 68

a) > Turn the table clockwise to the next programmed track
b) < Turn the table anticlockwise to the next programmed track
c) **"Turn"**: turn the table by 180°
d) **"End"**: interrupt the current action
e) **"Clr"**: continue with the interrupted action
f) Change of the desired direction for the direct selection of tracks via the number key board
g) You can select the desired track via the number key board g) and confirm it with the button h). The table will turn in the direction selected with button f) until it reaches the selected track.

In order to achieve the correct display of the turntable position the choice boxes of the configuration must be marked correctly.

Should the position displayed not correspond with the actual position you can update the display by means of the "Stop" mode.

Turn the command station to "Stop" and press the buttons a) or b) until the displayed position corresponds with the real one.

14.7. Controlling the turntable with the ESU LokPilot decoder
Alternatively to the "true" Märklin® turntable decoder you can also use a LokPilot V3.0. The functionality is assured, however, the turntable will stop at each track for a moment in order to synchronise itself.

The turntable has to be modified to allow the use of the LokPilot V3.0 decoder. The conversion is described nicely in a report in the 3-rail magazine. You can download this report from our website under "Support" in the "Hints and tricks" section.

14.7.1. Configuring the turntable

The turntable is entered as described in chapter 14.2.. However, now you enter "LokPilot DCC" at "Type of turntable".
In addition to the configuration options shown in chapter 14.2. there are two more parameters to be set:

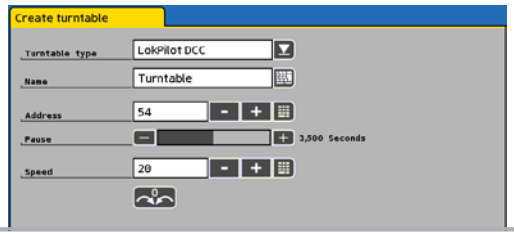

Figure 69

Pause	Here the length of the pause must be entered that the decoder has to adhere to between each individual step. The duration of the pause must be greater than the mechanical speed in order to allow the mechanical drive to arrest correctly at each step.
Speed	Here you enter the speed step with which the LokPilot operates the turntable. Do not select a speed too high in order to avoid damage of the turntable motor.
Zero point	Pressing this screen button sets the turntable position to the zero position. This serves to synchronise the display with the real position of the turntable.

15. Routes

Routes are also registered in lists analogue to locos and accessories. Routes therefore have to be defined first before they can be linked on a control panel and before they can be activated.
Definition means, which accessories belong to the route and which aspect or status should they have.

Only linked accessories can be added to a route. Therefore you should link all accessories before defining routes.

15.1. Define new route

- Call up the turnout control panel and press the configuration symbol
- Select the symbol "Enter new route". Empty frames will be displayed as targets for the possible allocation.

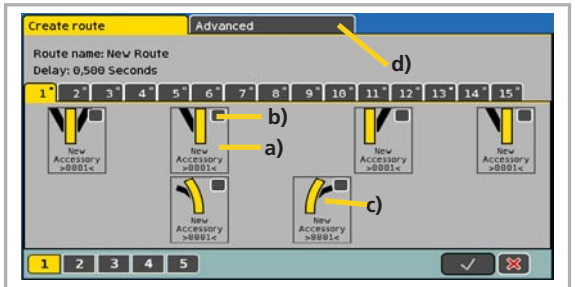

Figure 70

- Find the desired location where you want to display the symbol for a new route.
  a) Selection frame around all accessories
  b) Selection box. Active for each accessory within the route
  c) Desired aspect or status of the accessory in the route
  d) Tab „Extended"

  A selection frame is located around each accessory a). Other routes are faded out since a route may only contain accessories but not other routes. As always you may change between panels in order to see all linked accessories.
- Select the first accessory to be included in the route and mark it in the selection box at the top right with a tick.
- Push the accessory symbol and select the desired aspect or status.
- Select all other elements of the route and their desired aspect step by step.

ECoS triggers the commands in the same sequence as you have entered them. Keep that in mind when entering routes.

15.1.1. Extended settings

Once you have added all accessories to a route please change to „Extended". There you can set other important parameters.

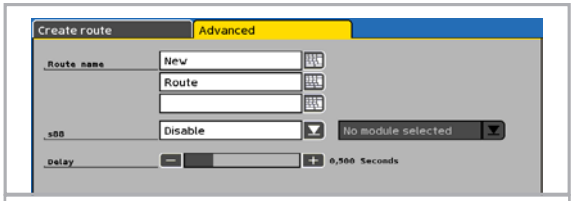

Figure 71

15.1.1.1. Name

For an unmistakeable recognition you may give each route a name on the screen. Three lines with 9 characters each are available.

15.1.1.2. Tact

When switching a route ECoS transmits individual pulses to the corresponding accessories. The time interval between two individual commands can be adjusted. This may be necessary if accessories with particularly high current draw are part of the route. They high current could lead to a voltage drop and the pause between commands assures reliable operation.

15.1.1.3. Trigger a route with an s88-contact

A mighty function is represented by the possibility to trigger a route not only by pushing a screen button but also by an s88-conctact.

This function can be used to realise block control: A train entering a block is detected by an s88 and the previous block is cleared.

- Enter the desired s88-module and the port number of the input that should switch the route.

The s88-bus must be configured prior to this procedure. Refer to chapter 22.

Of course, it is also possible to trigger the same route manually on the turnout control panel.

- Confirm your entries to save the new route. The data entry dialogue will be closed and the new route is registered.

If the dialogue window does not close und an „!" is displayed instead then the text is too long. ECoS checks the length of the text when saving it. In that case simply shorten the name of the route.

15.2. Edit a route

You can change or rename the route in the configuration menu at any time should you wish to so:

- Push the corresponding screen button
- Select the desired route and proceed as described in chapter 15.1.

15.3. Create a link to a route in the turnout control panel

You can create a link to the same route on several panels of the turnout control panel. Thus you can better organise your turnout control panel.

Linking routes happens in the same way as linking accessories. Chapter 13.3 explains how. Routes are marked with „FW" behind the name in the accessory library.

Figure 72

15.4. Switching a route

In principle a route is switched in the same way as an individual accessory as described in chapter 13.4. However, there are two differences:

This pictogram indicates that the route is currently not completed. At least one accessory did not switch as it was supposed to.

The route is completed; all accessories are switched to the desired status.

Routes can only be switched. Switching another route that contains at least one accessory of the previous route does releasing routes.

It is always possible to switch an accessory belonging to a route individually, for instance through another link to a screen button in a control panel. As soon as the status of at least one accessory does not correspond to the appropriate status of this route the displayed symbol changes. Thus you keep control at any time and have certainty that all accessories of one route are switched correctly.

15.5. Deleting a route

Deleting a route is just as simple as deleting an accessory:

- Call up the turnout control panel and go into the configuration mode.
- Select this symbol. Frames around all accessories and routes will appear.
- Select the desired route and confirm your choice.

16. Track diagram switching panel

With software version 3.0.0. an important feature has been added. By "drawing" a track diagram on the screen you can represent the topology of your layout graphically. You can switch any turnouts or signals simply by touching the appropriate symbol.

16.1. Configuring the track diagram

First call up the track diagram.

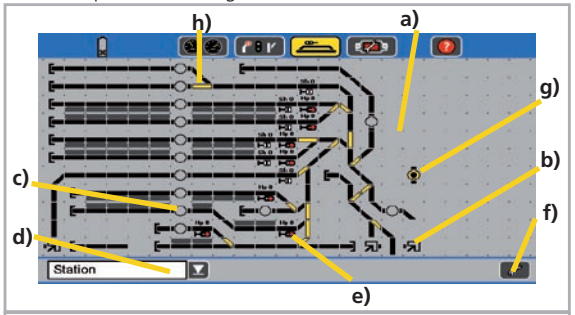

Figure 73

a) Area for placing track diagram elements (23 x11 elements)
b) Display of reference to other panels
c) Display of a route, not set
d) Select another panel
e) Representation of a signal
f) toggling between switching mode and configuration mode or vice versa
g) Display of a set route
h) Representation of a turnout

- In the **display mode** you can switch all signals, turnouts and routes directly.
- In the **configuration mode** you can modify the design of the track diagram.

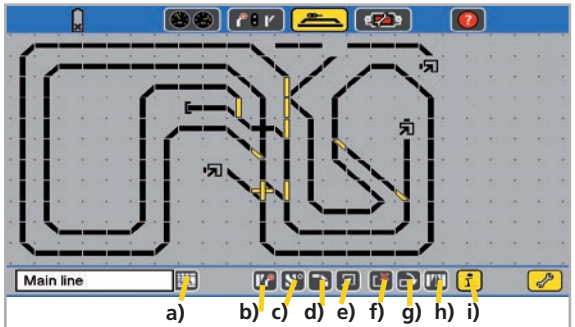

Figure 74

With this screen button you can toggle between these two modes. After pressing this button the display changes.

a) Name of the track diagram panel you are working on
b) Add an accessory
c) Add a route
d) Add track symbols
e) Add references to other panels
f) Delete the symbol
g) Turn the symbol
h) Mirror a turnout
i) Information field

The procedure of inserting symbols is always the same regardless whether it is a track symbol, an accessory or a route.

16.1.1. Inserting track symbols

Track symbols solely serve to represent the track arrangement and are purely passive elements.

- Select the screen button "Insert a track symbol"
- Click onto the desired position on the track diagram where you want to place the new track symbol.
- A window showing all available symbols opens. Select the desired symbol and turn it to the desired direction if necessary.

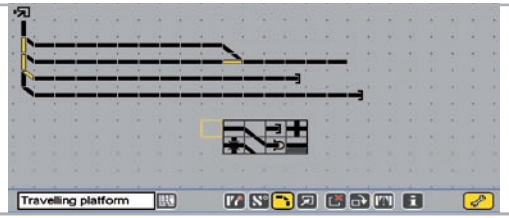

Figure 75

Curved track
Crossing (diamonds)
Parallel curved track
Platform track
Straight track
Buffer stop
Bridge / overpass
Tunnel

16.1.2. Insert an accessory

Any accessory that you want to insert on the track diagram must first be entered into the data base and configured. This is done in the turnout control panels as described in chapter 13. In the track diagram one cannot enter new accessories.

- Select the screen button "Insert accessory".
- Click onto the location in the track diagram where you want to place the accessory.
- A window showing all accessories will open.
- Select the desired accessory.

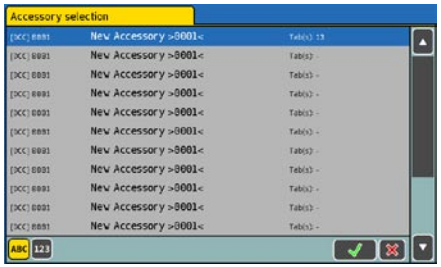

Figure 76

16.1.3. Insert a route

- Select the screen button "Insert a route".
- Click onto the location in the track diagram where you want to place the route button. A window showing all routes will open.
- Select the desired route.

You can switch a route in the track diagram at any time. The currently set route is highlighted.

Route, not set

Route, all accessories set correctly

16.1.4. References to other panels

For easier navigation between different panels you can enter references on each page. When pressing the reference symbol that panel will be automatically displayed.

- Select the screen button "Reference to other panels".
- Click onto the location in the track diagram where you want to place the reference button. A window showing all panels will open.
- Select the desired panel.

16.1.5. Turn elements

In order to achieve the desired orientation of a symbol you can turn them clockwise, even at a later stage.

- Select the screen button "Turn symbol".
- Click onto the symbol that you wish to turn.

When establishing longer sections of straight track you should have inserted at least on such symbol. Then you can turn it to the desired orientation. When you insert the same symbol subsequently it will automatically appear with the correct orientation.

16.1.6. Mirroring turnouts

In order to draw so called 45° yard ladders it may be necessary to mirror turnouts. Thus a right hand turnout changes to be a left hand one. Only right hand and left hand turnouts can be mirrored.

- Select the screen button "Mirror turnout".
- Click onto the symbol of the (right hand or left hand) turnout that you wish to mirror.

16.1.7. Delete symbols

Symbols no longer required or inserted by mistake can be deleted at any time.

Only the track and accessory symbols are deleted not the actual accessories or routes. If you wish to delete an accessory or route you must do this in the turnout control panel.

- Select the screen button "Delete symbol.
- Click onto the symbol that you wish to delete.

16.1.8. Change the name of the page

While in the configuration mode you may give each page (panel) its own name.

- Select the panel whose name you want to change.
- Click onto the keyboard symbol and enter the name.

16.1.9. Information regarding accessories / routes

Occasionally one wants to find out which accessories or routes are hidden behind a certain symbol. This can be done easily.

- Select the screen button "Field info".

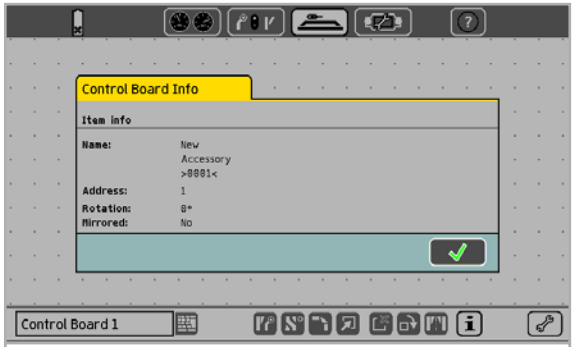

Figure 77

- Click onto the symbol of which you want more info. A window providing detailed information will open.

17. Running trains in „shuttle train" mode

The shuttle train function is quite a useful tool for running locomotives automatically between two points (terminal stations).

ECoS differentiates between two terms:

- Shuttle train line: the track section on which the loco should travel forward and backwards
- Loco in shuttle train mode: loco that is dynamically assigned to a shuttle train line and travels „out and back".

A shuttle train line must comprise of the following:

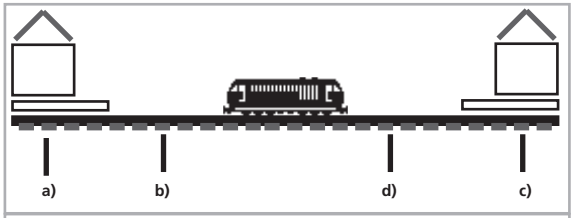

Figure 78

a) Station1
b) Brake point for station1
c) Station 2
d) Brake point for station 2

The train stops at each station for a pre-determined layover time before it travels back to the other station. The sequence happens as follows:

- As soon as the train from station 1 reaches the brake point for station 2, ECoS transmits a „Stop" command (speed step „0") to the train. At the same time a timer is started inside ECoS.
- The train slows down with the set deceleration and stops. Deceleration has to be set in such a way that the train definitely stops in station 2. You may have to experiment a little.
- Once the pre-set layover time is past (T1), the timer gives the signal and the train receives a command to change direction. The train is still stopped in station 2; it is now ready for departure and the headlights are switched correctly for the return trip.
- Once the timer signals departure time (T2) the train accelerates and moves towards station 1. Thus the procedure begins once again.
- The periods T1 and T2 are of equal duration. The time the train takes from brake point 1 plus the time the train is stopped while still set to the original direction is the same as the time the train waits in the station after having changed the direction setting.
- These periods are identical for both stations. The distance from the brake points to the station must be the same in both stations since the braking distance is subject to the set deceleration of the locomotive.

For detecting the brake points you have to install and assign two s88-contacts.

17.1. Configuring a shuttle train line

A shuttle train line can easily be configured:

- Select the set-up symbol from the top tool bar. A window with several pictograms located on the left opens.
- First select "Set-up 2" at the top, then the fourth pictogram from the top. Then the "Shuttle train" dialogue window will open.

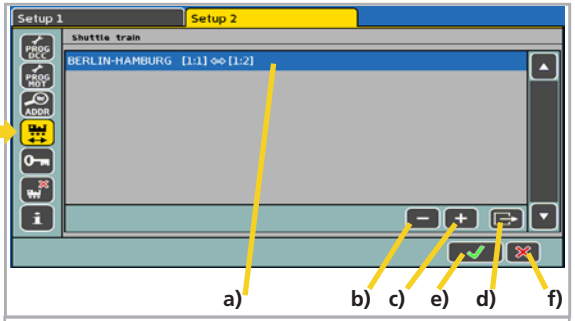

Figure 79

a) Shuttle train lines that are already configured
b) Delete a shuttle train line
c) Add a shuttle train line
d) Edit a shuttle train line
e) Leave the set-up menue and save changes
f) Leave the set-up menue and cancel changes

Pushing this screen button opens the sub-window „Shuttle Train Line".

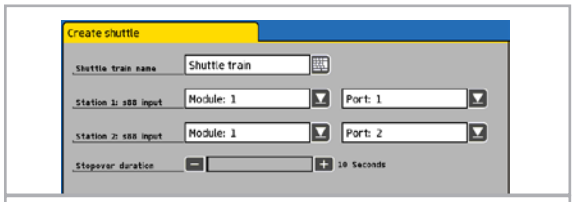

Figure 80

Name of the (shuttle train) line
Assign explicit names to your shuttle train lines. This name is required later for assigning the line.

Station1: s88-contact and **Station2:** s88-contact

Here you select the two s88-contacts for the brake points of the shuttle train line. The s88-bus must be correctly configured prior to this action. See also chapter 22.

Use two separate s88-contacts. ECoS does not check if these contacts are used for any other action.

Layover time in the stations
Here you enter the time T1+T2 (in total). This may be up to 300 seconds.

Finish your data entry, the window closes and the new shuttle train line is displayed on the screen. Enter other shuttle train lines in a similar fashion.

ECoS can handle up to 8 shuttle train lines.

Pushing this symbol for the marked shuttle train line deletes it.

Open and edit the marked shuttle train line with this symbol.

17.2. Locos travel „out-and-back"

Once you have configured your „shuttle train lines" you may dispatch a train.

- Call up the loco onto one of the two cabs.
- Move the loco into the shuttle train mode.
- Set the throttle to the desired speed.
- Select „Shuttle Train Line" from the menue.

Figure 81

- Choose the desired Shuttle Train Line from the sub menue.
- Now the locomotive will be controlled by the Shuttle Train Line control function and cannot be controlled manually any longer. An icon on the speedometer indicates this.

17.3. Cancel shuttle train mode

If you wish to run this loco manually again proceed as follows:

- Call up the loco on the same throttle that you used to set up the shuttle train mode.
- Select „Shuttle Train Line" in the locomotive menue.

Figure 82

- Select „Cancel Shuttle Train Mode"
- Now the loco can be controlled manually.

18. Programming Decoders

By programming we mean the method of electronically changing certain parameters of decoders. This applies to all types of decoders such as mobile decoders, accessory decoders and feedback decoders. Decoders with manual switches (DIP-switches) such as older models from Märklin® cannot be programmed with ECoS.

Unfortunately there is no standardised method to access all parameters; this varies subject to the manufacturer and decoder type.

Generally it can be said that all parameters of a decoder are stored in an internal memory space. Each memory space can contain a number. The memory spaces are numbered in sequence. Since the value of each memory space can be changed at any time they are also know as variables. With these variables the properties of the decoder are defined („configured") and thus the term „Configuration Variable" (CV) was introduced.

The values stored in each CV determine the behaviour of the decoder to a great deal. Values that are not permitted or wrong may cause havoc to the point that the decoder does not work properly or not at all any more.

Change decoder settings only if you are certain about the consequences. Otherwise you may experience all sorts of unexplainable behaviour.

In the DCC standards the properties resp. characteristics of most CVs are defined. A complete list of all CVs and further information to the DCC standards is available

www.nmra.org/standards/DCC

Please also refer to your decoder manual. There you will find all supported CVs as well as their meaning.

18.1. DCC-Programming

The range of possibilities in programming DCC decoders has continuously improved over the years. Therefore there are different methods that are incompatible to each other:

Register Mode:	Here you can only access CVs 1 to 8.
Paged Mode:	On the programming track CVs 1 to 1024 can be reached
Direct Mode:	On the programming track CVs1 to1024 can be reached. Reading out decoder data is about 8-times faster than in Paged Mode.
POM Mode:	Here programming is done on the main line („Programming On Main"). All CVs from 2 to 1024 can be overwritten. The base address CV1 cannot be accessed.

Unfortunately there is no rule regarding the fact which decoder supports which programming method. For new decoders the Direct Mode is compulsory. All ESU decoders support Direct Mode as well as the other methods.

Refer to the manual of your decoder to find out which programming methods are supported.

Currently ECoS only supports the Direct Mode and the POM Mode. Very old decoders may not be programmable with ECoS.

18.1.1. Direct Mode (CV-Mode)

For programming in DCC Direct Mode (also known as CV-mode) the loco has to be located on the programming track. No other loco may be on the programming track at that time otherwise they will also be programmed simultaneously. In Direct Mode you can read and write CVs.

18.1.2. Programming on the Main (POM)

In the POM mode the loco may remain on the layout and is re-programmed while running on the layout. Thus you may observe and correct any changes directly.

Some decoders can only be programmed on the main if they are set to speed step „0". ESU decoders can also be adjusted while running.

In order to program a loco on the main ECoS must transmit specific commands to this loco. Therefore the current address of the loco must be known, otherwise it cannot be programmed.

Should you not know the address of a loco place it on the programming track. There you can read out or reprogram the address.

18.2. Introduction to Motorola®-programming

With the LokPilot ESU has introduced a method to program Motorola®-decoders despite the fact that the original Märklin® digital system did not cater for this option. Every ESU decoder (except for pure DCC decoders) contains a specific so-called 6021-programming mode that allows access to all or at least to the most important CVs of a decoder. They can be written but not read.

Meanwhile Märklin® has also started to equip many locos with decoders that support this special mode developed by ESU. These could be affordable decoders without „DIP switches", which are installed in many locomotives.

The ECoS Motorola® programming mode can be used for all ESU decoders and most Märklin® decoders but not necessarily for decoders by other manufacturers.
Locomotives with M4 decoders and Märklin® mfx® locomotives cannot be programmed with the Motorola® programming but rather the graphic method via the so called decoder profile. Refer to chapter 18.5. for details.

The address search mode represents a very special feature. It can be used to determine the address of older decoders that are not suitable for the Motorola® programming mode: ECoS tests all possible addresses and stops as soon as the loco responds. Thus you never have to open your locos again in order to check DIP switches!

18.3. Overview of programming options

		Main track	Programming track
DCC-Decoder (ESU)	Write in DCC Direct Mode	No	Yes
	Write in DCC Paged Mode	No	No
	Write in DCC Register Mode	No	No
	Write in DCC „POM mode"	Yes	Yes
	Read in DCC Direct Mode	No	Yes
	Read in DCC Paged Mode	No	No
	Read in DCC Register Mode	No	No
	Read of values on graphic interface	No	Yes
Motorola®-Decoder (ESU)	Search Motorola® address	No	Yes
	Write in ESU Motorola® programming mode	No	Yes
	Read all values on graphic interface	No	No
Motorola®-Decoder (DIP-switch)	Search Motorola® address	No	Yes
	Read all values on graphic interface	No	No
Selectrix®-Decoder	Write base values in Selectrix®	No	No
	Read base values in Selectrix®	No	No
	Read all values on graphic interface	No	No
mfx®-Decoder	Write in ESU Motorola® programming mode	No	Yes
	Search Motorola® address	No	Yes
	Read all values on graphic interface	Yes	Yes

18.4. Manual programming (DCC)

For all steps of programming please consider: Always place only **one** loco on the programming track. Make sure there is good electrical contact. There must be a motor connected to the decoder otherwise ECoS cannot receive the confirmation pulses and will erroneously report an error.

All described programming modes can be used with a universal, graphical programming window.

- Open the set-up menue. Call up "Set-up 2" at the top of the screen.
- Select this pictogram on the left to open the DCC programming window. The following picture appears:

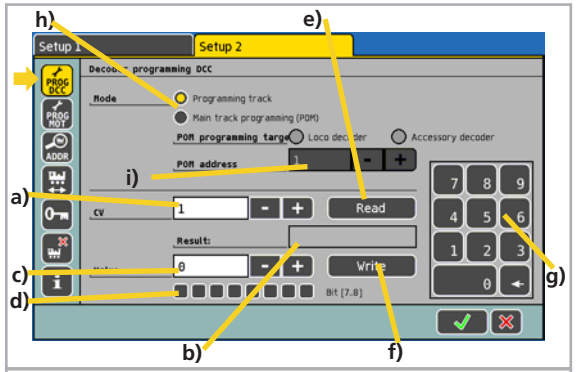

Figure 83

a) CV-number that should be read or programmed
b) Currently read value / error reports
c) New value, that you want to write (input in decimal numbers)
d) Binary display of the current value entered in c)
e) „Read" screen button
f) „Write" screen button
g) Number block for data entry
h) Choice between POM and programming track mode
i) Current loco address (is needed for POM)

- First select if you want to use POM or programming on the programming track. Remember: you can only read decoder data on the programming track.

18.4.1. Read CVs

Only possible on the programming track.

- Enter the CV number in field a), that you want to read.
- Push the screen button e) „Read CV"

Lesen

- After a short while the current value will be displayed in field b).
- If you were not successful „Error" or „No Loco" will be displayed.

„No Loco" means that no loco was found on the programming track or that the current draw was below 4mA. Check the electrical contacts.

ECoS tries first to read a CV in Direct Mode. If this does not work ECoS attempts to read the CV in Paged resp. Register Mode. This may take up to 30 seconds.

18.4.2. Write CVs

- Enter the CV number in field a), that you want to write.
- Enter the new value of the CV in field c). It may be entered in decimal format or with the 8-bit blocks in binary format. Bit 0 is far right, bit 7 far left.

Lenz calls the bits of a CV sometimes switches and counts from 1 to 8. ECoS counts as per the DCC standards from 0 to 7.

Schreiben

- Push the screen button f) „Write CV"
- If successful the word „OK" will be displayed after as short while in field b)
- If not successful then „Error" or „No Loco" will be displayed.

„No Loco" means that no loco was found on the programming track or that the current draw was below 4mA. Check the electrical contacts.

In very rare cases it may happen that „Error" is displayed even though writing the CV was successful. ECoS always waits for confirmation from the decoder and in some cases this may not happen or may not be recognised by ECoS!

18.4.3. Programming on the Main (POM)

Only for DCC. When you select this mode you must enter the current address in field i). Reading is not permitted in this mode.

18.5. Manual programming (Motorola®)

- Call up the set-up menu. Then open "Set-up 2" at the top of the screen.
- Select this pictogram at the left in order to open the Motorola® programming dialogue. The following window will open:

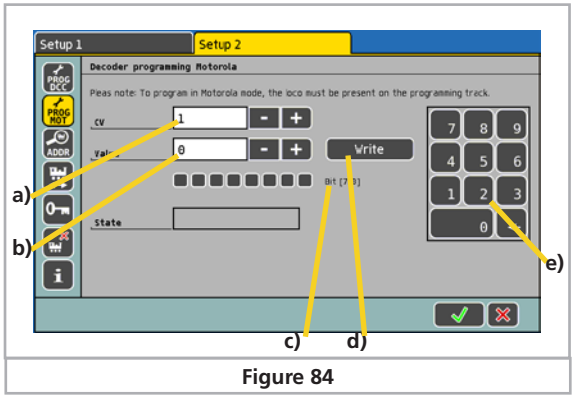

Figure 84

a) CV number to be programmed
c) New value to be entered (data entry in decimal format e.g.: as a number)
d) Binary representation of the current value in c)
f) Screen button "Write data"
g) Number block for data entry

Please bear in mind that a pure Motorola® decoder does not support CVs. Some decoders particularly the ones from ESU or Märklin® offer this feature. This feature enables you to write new values in the CVs but not to get a readout. It cannot be assured that the decoder actually supports these commands since there is no standard specifying the programming method for decoders in the Motorola® mode. However, the programming method introduced by ESU in 2001 gains more and more market penetration.

If the decoder also supports DCC you should program it in DCC mode (also refer to chapter 18.4).

You should program M4 decoders solely via the graphic interface and the decoder profile.

18.6. Searching the address

A useful function particularly for finding the Motorola® address of older decoders. ECoS tests all 255 possible addresses and checks if the loco responds.

This search mode only works if the acceleration has been set to a low value.

- Call up the set-up menu and select "Set-up 2".
- Select the third pictogram from the top and an address menu will open.

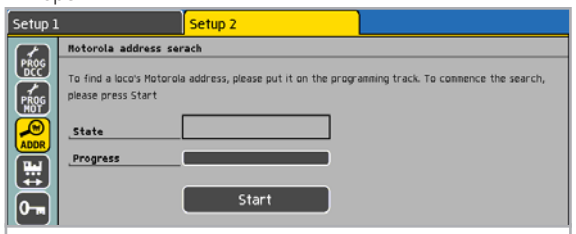
Setup 1
Setup 2
Motorola address serach
To find a loco's Motorola address, please put it on the programming track. To commence the search, please press Start
State
Progress
Start

Figure 85

- Place the locomotive on the programming track and press "Start". The loco will move for a moment. Make sure it cannot fall off the layout. Please always use buffer stops to secure the programming track.

18.7. Graphic programming

Besides the sometimes cumbersome method of direct CV programming – after all, who knows all CV numbers by memory – ECoS offers a comfortable alternative method:

All ESU decoders and many others can be programmed easily without having to know CV numbers.

Märklin® mfx® locomotives and those with ESU M4 decoders can also be programmed with the graphic interface. Since M4 decoders do not have any CV numbers this is in fact the only useful method.

This is possible due to decoder profiles.

18.7.1. Decoder profile for ESU and mfx® decoders

A decoder profile is a description of the parameters of a decoder. All CV numbers, their value ranges and their purpose, as well as the layout of the elements on the ECoS monitor are summarised here. Every decoder that has a graphic profile can be programmed by this method.

The ECoS has profiles for all ESU decoders, M4 decoders (with or without sound) as well as two generic DCC profiles for decoders by other manufacturers.

18.7.2. Manual configuration of decoder profiles (DCC)

The only exceptions are locomotives with M4 decoders: Here the suitable profile is automatically set and cannot be modified.

You may assign each loco a decoder profile as follows:

- Call up the loco on a throttle
- Open the loco menue and select „Edit Loco".
- Change to the third tab called „Extended" and a window opens.

a) Global settings
b) Address settings
c) Analogue settings
d) Running characteristics
e) Motor settings

Figure 86

f) Function mapping
g) Sound settings

The content of the individual sub-dialogues depends on the available decoder options resp. the assigned profile. For instance sound settings will only be available in a LokSound decoder.

- Select the matching decoder profile in the choice list "Decoder Profile". If the decoder is not in the list choose "Empty".

As soon as you have selected a decoder profile the sections b) to g) will be loaded with the settings of the corresponding decoder. Now you can comfortably modify any settings on the graphic display.

ECoS transfers standard values according to a manual profile selection. They do not necessarily match the actual values of your loco. Therefore we recommend using the automatic assignment of profiles.

18.7.3. Automatic assignment of profiles (DCC)

During the automatic assignment of the decoder profile the decoder data is read out and then the matching profile is assigned. All CV values of the decoder are read simultaneously and displayed on the graphic interface. That way it can be assured that the displayed settings correspond with the ones saved in ECoS. This is how you proceed in detail:

- Place the loco on the programming track.
- Call up the loco on one of the two cabs
- Open the loco menue and select "Edit Loco".
- Change to the third tab called "Extended" and a window as shown in figure 86 opens.
- Touch the screen button "Continue" to start the read out.
- First ECoS finds out which decoder type is used and then selects the matching profile.
- ECoS reads out all CV values from the decoder. This may take a while.
- Finish the process by pushing "Finish".
- If the command station cannot read the decoder in DCC mode then it will try to establish a Motorola® address. In this case the command station assumes that the decoder is a non- readable Motorola® decoder.

18.7.4. Profiles of M4 decoders

The command station will automatically detect and preset the decoder profile for all M4 decoders it recognises. This profile cannot be changed. The procedure for adjusting decoder parameters is done in the same manner as with DCC decoders.

This similarity of the procedure should not mislead you: M4 decoders do not have CVs that can be directly accessed.

18.7.5. Editing decoder settings

After assigning a decoder profile you can edit any decoder parameters comfortably on the graphic display. Initially all changes are set in ECoS only and not transferred to the decoder. Of course, you can transfer (program) the data set locally on ECoS to the decoder at any time.

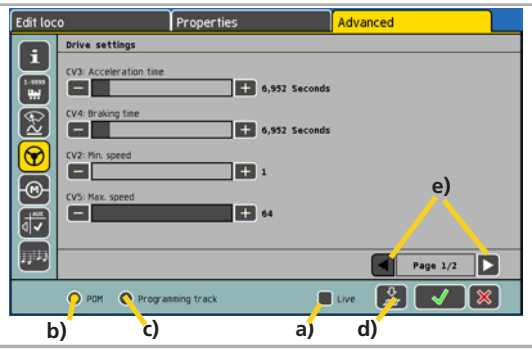

Figure 87

a) Choice field "Live"

b) Radio button „POM" (=Programming On the Main)

c) Radio button „Programming track"

d) Screen button "Write data on decoder"

e) Paging up and down in the submenus

- First decide if you want to program on the mains (POM) or on the programming track. The selection is done with the two radio buttons b) and c). In case of M4 decoders POM is automatically preset and cannot be changed.

If you want to use POM then you may not change the address. Address changes can only be accomplished on the programming track.

18.7.5.1. Download mode

- Transfer the complete set of data to the loco by pushing the screen button d).

All CV data of the decoder will be overwritten. Please check if you actually want to proceed before pushing this button!

18.7.5.2. Live mode

In POM mode you can observe all changes "live" during the programming process: ECoS transmits all changes to the (running) loco immediately. Thus programming becomes far easier than previously.

- Activate the screen button a) "Live" while in POM mode.
- As soon as you now change any value with the slide controller (e.g. CV5, maximum speed) the new value is transmitted to the loco and you see the effect immediately.

Live mode is not suitable for

- Setting addresses
- Function mapping

18.7.6. More info on profiles

- There is a matching profile for every ESU decoder. However, a profile does not necessarily contain all decoder parameters. Some rarely used settings should be adjusted manually as described in chapter 18.4. Alternately you could use our LokProgrammer with its computer software.
- For DCC decoders by other suppliers it is best to use the generic NMRA profile. For extended settings we recommend to use manual programming of CVs.

18.8. Programming Märklin® 763xx series signals

The following steps are required for programming the digital signals of the 763xx series (e. g.: 76391, 76393, etc.):

1. Leave the signal electronics in the package and insert it into the contact bar in the box. Make sure it is positively arrested.
2. Enter a new accessory on the ECoS as described in chapter 13.1. Select the matching type of signal from the choice list. If there is a distant signal on the mast of the main signal then you must also set up the main signal to which the distant signal refers. Assign the desired "Weisen" number to each signal. Select "Momentary action mode".

   Set the switch pulse duration to 2500ms for programming.

   Do not forget to enter the corresponding main signals for distant signals on the same mast as accessories.
3. In order to be able to switch this accessory you must establish a link on one of the turnout control panel panels.
4. Switch off the ECoS.
5. Remove the connection form the ECoS to the layout. Connect only the signal to be programmed to the track output of the ECoS.
6. Switch on the ECoS. As soon as the ECoS is operational press the "Stop" button (emergency stop).
7. Press the "Go" button of the ECoS. The signal will now alternate between two aspects. The following procedure depends on the type of signal.

   76391/76371/76372: confirm the signal on the screen. The signal will be programmed with the preset time of 2500 ms.

   76392/76394: Switch to signal aspect Hp1. Wait until the signal starts to alternate between different signal aspects. Then switch to signal aspect Hp2.

   76395/76397: the initial steps are the same as for the signals 76391 resp. 76393. Thereafter the distant signal will start to alternate between two signal aspects. Activate Hp1 or Hp0 of the corresponding main signal. If the distant signal is linked to a two-aspect main signal then press HP1 or Hp0 once again after the distant signal has started again to alternate between two aspects. Otherwise you activate the signal aspect Hp2 of the corresponding main signal. In this case the allocation of the second address will happen automatically.
8. The signal is now programmed. Turn off the ECoS. Remove the signal from the box and install it on the layout.

- Only start with the further steps once the signal has begun to alternate between the two signal aspects once more.
- It is quite sufficient to trigger the commands very briefly. The required switching time is predetermined by the setting to 2500 ms. For later operation you should change this value to a more practical number (e.g. 500 ms).
- In case of very long pauses between the individual steps the signal may terminate the programming process. Restart the process by pressing the „Stop" button once again.

19. ECoSniffer

The ECoSniffer enables you to continue to use your old digital system.

ECoSniffer behaves like a digital decoder and translates all track signals into information that can be processed by ECoS.

While all previously launched digital systems are based on addresses ECoS establishes a library (loco list) with names. Since there could be several locos with the same address the loco address of the old system must be linked to the appropriate name of the loco in ECoS.

For each entry in the loco library you can assign a so-called "Sniffer Address" besides the real decoder address. This Sniffer address is independent of the real address and only serves to link the address received from the old digital system (e. g. Märklin® 6021) to the locos in the ECoS loco library.

19.1. Sniffer addresses for locomotives

Sniffer addresses are stored as additional parameter in each loco and in the loco library.

Since they are independent of each other some fascinating sequences can be realised:

Example:

You have connected a 6021 to ECoSniffer as per Figure 26. The 6021 can only handle addresses from 01 to 80 in Motorola® format.

Let's assume you have a "Blue Tiger Class 250" with address "250" in DCC format and now want to run it with the 6021. You want to use address "25" on the 6021. Simply enter "25" as the Sniffer address for the Blue Tiger.

From now on the Blue Tiger will respond to the address 25 on your 6021. ECoS links the address "25" by the 6021 to the Blue Tiger, detects that it is actually run with the decoder address "250" (even in DCC mode!) and runs the loco with this address in DCC mode. In other words it is no problem to use a Motorola® command of the 6021 to run a DCC loco.

Figure 88

- Assign each Sniffer address to one loco only. ECoS does not check if the address has been assigned previously during data entry.
- Assign the Sniffer address "0" to locos that you do not want to run with the old system.
- Of course you cannot extend the address range of your old system: A 6021 can only handle addresses from 01 to 80. If you for instance enter Sniffer address "85" then you will not be able to run this loco with your 6021.
- In DCC format ECoSniffer detects only function buttons F0 to F12 of your old system.
- In Motorola® format ECoSniffer detects only function buttons F0 to F4. ECoS cannot detect extended function buttons (F5 to F8) via the following address.

19.2. Hints for using ECoSniffer

Of course, there are some limits to what ECoSniffer can do. Since communication only takes place in one direction it is not possible to transmit signals to the old system: If you for instance run a loco with your old system on speed step "10" and subsequently reduce this to speed step "2" with one of the two cabs on ECoS, the old system will still show speed step "10".

- Do not call up a loco on your old system and on an ECoS throttle at the same time. This could lead to problems.
- Run your DCC locos always with 28 or 128 speed steps in your old system since ECoSniffer cannot differentiate reliably between 14 and 28 speed steps.
- If you do not wish to run a loco with your old system anymore stop the loco with your old system and turn off all functions. After some time ECoSniffer will delete this loco from its internal check list (purging).

19.3. Switching accessories with older digital devices (devices by others)

Of course you can also switch accessories via the ECoSniffer. The accessory addresses are directly transferred to the command station by the ECoSniffer and switched immediately. There are no sniffer addresses for accessories.

It is obligatory that you first enter each accessory that you want to switch with your older device on your ECoS. Pleas also refer to chapter 13. If you would like to switch a turnout with your older device (e.g. Märklin® 6021 with keyboard) that has not been entered into the ECoS then this turnout will not respond to your commands.

20. Devices for the ECoSlink bus

The ECoSlink serves for extensions of the ECoS. You can connect external handheld controllers, feedback modules, boosters and other devices to the ECoSlink. ECoSlink is based on the industrial standard CAN that guarantees a maximum cable length of 100m and a data rate of 250.

All devices are automatically detected by the system and can be unplugged and reconnected during operation. We would like to briefly present the most important devices for the expansion of your system.

20.1. Extending ECoSlink

The command station offers three sockets for direct connection of devices. Should this number not be sufficient then you must install a bus distribution module.

20.1.1. ECoSlink terminal

At the front of the ECoSlink terminal there are two sockets for handheld controllers (e.g.: Märklin® mobile station) and at the back there are another 4 sockets for ECoSBoost or ECoSDetector modules.

The ECoSlink terminal can provide power to all connected devices via the command station. Alternatively an external power pack can be used for the part of the system connected to it.

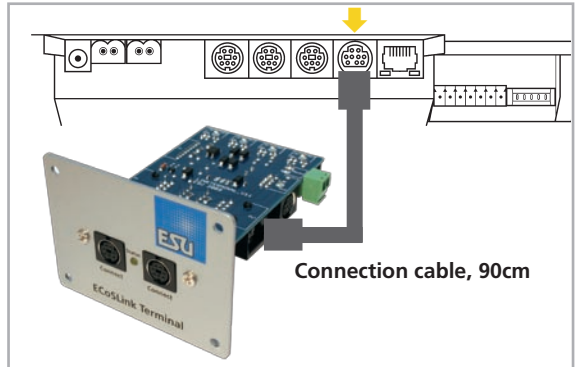

Figure 89

The ECoSlink terminal is connected with the 90cm long cable (supplied with the ECoSlink terminal) to the ECoSlink Extend socket. All other ECoSlink terminals can be connected by means of a commercially available computer cable (so called patch cable).

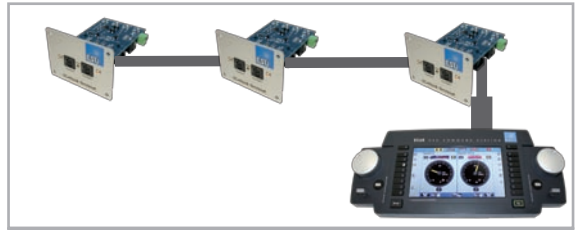

Figure 90

20.2. Märklin® Mobile Station

You can connect up to three Märklin® mobile stations 60651 and 60652 as additional cabs directly to the ECoS. More mobile stations can be wired via an ECoSlink terminal.

The dedicated adapter cable (from 10-pole to 7-pole) must be used in all circumstances. This adapter cable is supplied with the Märklin®mobile station 60652 or is available as a spare part under the Märklin® part number 610 479 at your local hobby shop.

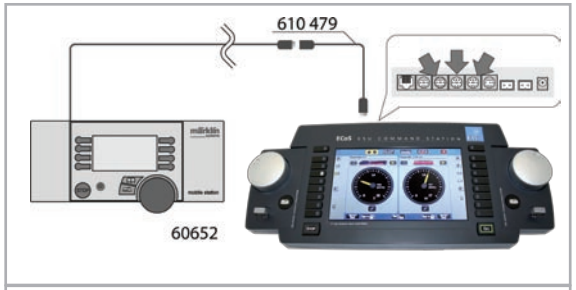

Figure 91

If you connect a mobile station to the command station for the first time then the internal software version of the mobile station will be checked. Should the mobile station still work with an older software version than the command station then it will be automatically updated.
The mobile station will not respond to any commands or display anything on the screen during this process. This is quite normal! On the screen of the command station a remark referring to this process will be displayed.

Figure 92

After the software update a reset will take place and all locomotives stored in the data base of the mobile station will be deleted!

20.2.1. Allocating locomotives

One can allocate up to 10 locomotives from the data base of the command station to each connected mobile station . This process is conducted in the "Set-up" menu.

- Select the set-up symbol in the top menu bar and a menu dialogue window with some pictograms on the left will open.
- Select the second pictogram from the top and the dialogue window "Devices in the system" will open.
- Select the desired mobile station and press the "Hand" pictogram. The configuration dialogue will open in which you can allocate locomotives to the mobile station.

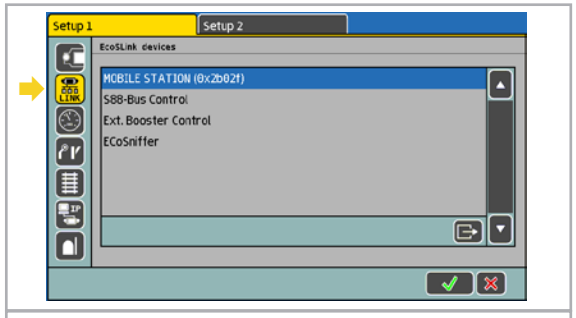

Figure 93

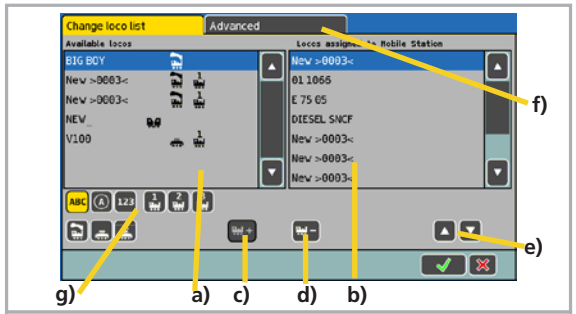

Figure 94

a) List of all locomotives
b) List of already allocated locomotives
c) Add a locomotive to the mobile station
d) Delete a locomotive from the mobile station
e) Move the locomotive marked on the right upwards resp. downwards
f) Extended settings
g) Sorting and filter options for the left locomotive list

- Select the desired locomotive from the left locomotive list and add it by pressing the symbol c).
- Select locomotive no longer required in the right hand list and press the symbol d).

You may allocate up to 10 locomotives. The mobile station can control locomotives with any data format since ultimately the data format is generated by the ECoS.

20.2.2. Extended settings

In order to differentiate between different mobile stations you can give each mobile station a name in the tab "Extensions".

Figure 95

21. Configuration menue

Basic operational parameters are edited via the set-up menue.

After touching the pictogram for the set-up menue at the top of the monitor the set-up dialogue is opened. This is structured over several pages (windows).

21.1. General settings

Figure 96

21.1.1. Setting the language

Select the desired language from the choice list. Any adjustments will be accepted immediately.

21.1.2. LCD contrast and brightness

With the slide controllers for brightness and contrast you can adapt the screen to the surroundings and your personal preference.

21.1.3. Current threshold of the internal booster

In the choice list "Current limit of the internal booster" you can reduce the maximum current if so desired. Never set the current limit to a higher value as necessary in order to avoid damage or welded rails in case of a short circuit.

The current threshold of other boosters connected to the ECoSBoost booster is set in the configuration menu "Devices in the system". Please also refer to chapter 21.3.2.

If you place a tick behind the remark "Only switch off the affected booster circuit in case of a short circuit" then the internal booster of the ECoS will not be turned off whenever other boosters report a short circuit. Thus you can set the system so that the internal booster will only be switched off if a short circuit occurs in its own district.

The "Go" button blinks green if at least one booster district is switched off due to a short circuit.

21.1.4. Reset

Pressing the screen button "Factory default values" triggers a factory reset. All data in the command station will be deleted including all data related to locomotives, accessories, routes and track diagrams.

This reset is carried out immediately.

For safety reasons the button „Reset“ is normally shaded grey. Before activating a reset you have to permit access to this function as described in chapter 21.6.

21.1.5. Restarting the ECoS
Restarting the ECoS is done by pressing the screen button “Restart the ECoS”. All settings remain intact. Such a restart may resolve some software issues and takes considerably less time than a complete shutdown and a new booting procedure.

21.2. Devices in the system
In this menue all devices that are currently connected to the ECoSlink bus. Each device reports automatically to ECoS (Plug & Play) and generally can be configured further if required.

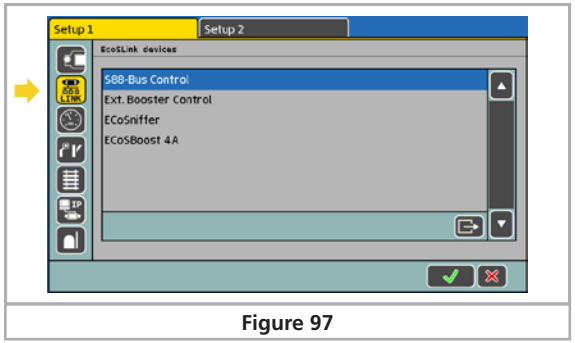

Figure 97

The devices “ECoSniffer”, “s88-Bus Control” and “External Booster Control” will always be displayed even if there are no external devices connected. ECoSlink These three devices are integrated into ECoS but are displayed via the ECoSlink as if they were external.

21.2.1. 6021 and DCC booster configuration
As mentioned in chapter 8.7 different booster types use different methods for detecting a short circuit. The time it takes from detecting a short circuit until ECoS turns off the track power must be adjusted to the type of booster to assure safe operations and to avoid erroneous switch-offs.

These settings are adjusted in the sub-menue “Booster Configuration”.

You find this menue via the set-up menue “Configuring Devices” as per figure 97: Select “External Booster Control” from the list of devices and press “Edit”.

Then enter the delay time directly in “Delaying Short Circuit Detection”:

- Select “0 ms” for DCC compatible boosters (e.g. Lenz)
- Select “1500 ms” for LDT boosters
- Select “2000 ms” for Märklin® 6017-boosters

Start with “0 ms” for all other makes and test it.

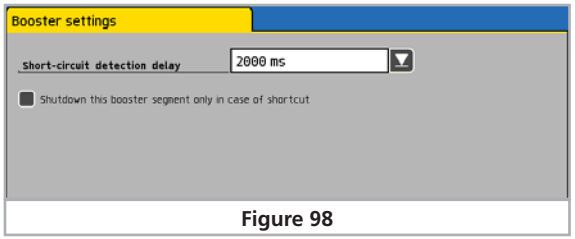

Figure 98

Make sure that both a Motorola®- and a DCC-loco are active. Some boosters cannot handle DCC packets very well. Should ECoS switch off immediately (STOP button is illuminated red) then the time must be increased.

If you set the tick behind “Ignore short circuit in other booster circuits” the internal booster does not switch off whenever other boosters report a short circuit. Thus the internal booster only switches off if a short circuit occurs in its own district.

21.2.2. ECoSBoost configuration
For each ECoSBoost booster connected you can set the current threshold individually.

Simply choose the desired booster from the list “Devices in the system” and select the configuration menu.

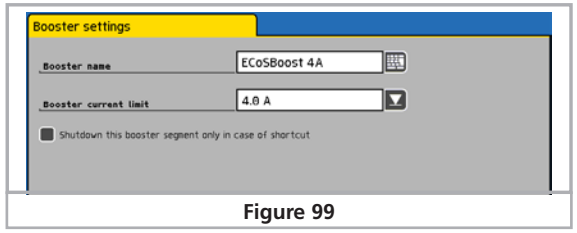

Figure 99

Name
Enter the desired name. This way you can keep your boosters apart. If you have several
ECoSBoost boosters you should plug them into the command station and configure them one by one in order to keep everything organised.

Current
If you wish you can reduce the maximum current with the choice list “Current”. Never set the current to a higher level than necessary in order to avoid any damage or welded rails in case of a short circuit.

If you place a tick behind the remark “Ignore other boosters” then the internal booster of the ECoS will **not** be turned off whenever other boosters report a short circuit. Thus you can set the system so that the internal booster will only be switched off if a short circuit occurs in its own district.

21.3. Train operations mode

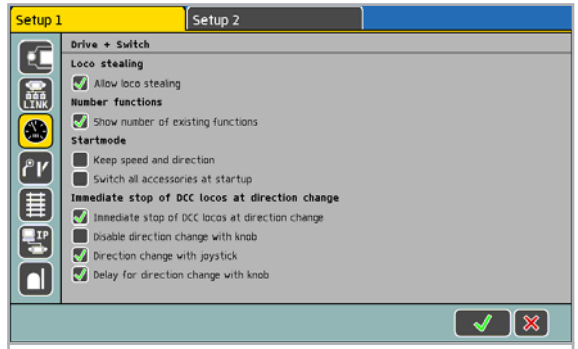
Setup 1
Setup 2
Drive + Switch
Loco stealing
Allow loco stealing
Number functions
Show number of existing functions
Startmode
Keep speed and direction
Switch all accessories at startup
Immediate stop of DCC locos at direction change
Immediate stop of DCC locos at direction change
Disable direction change with knob
Direction change with joystick
Delay for direction change with knob

Figure 100

21.3.1. Taking over locomotives
If you place a tick in front of “Taking over locomotives” then you can take over (“pinch”) a locomotive from another cab at any time (parallel operation).

21.3.2. Numbering functions
If this feature is active, then the function buttons (symbols) are numbered in order to make it easier to keep them apart. A small number will appear at the bottom right of each function button symbol. This feature is active ex works.

21.3.3. Starting mode

21.3.3.1. Starting mode for locomotives
Here you determine if operating parameters of locomotives (speed, function status, direction) should be transmitted to the individual locomotives after turning on the ECoS in the same manner as they were set prior to the last shut down.

Thus you are in a position to continue to play exactly where you left off in the previous operating session.

21.3.3.2. Turnout control starting mode
Here you determine if the command station should transmit a switch command to each accessory after initialisation. This is particularly useful in semi- or fully-automatic operating mode in order to assure that all turnouts and signals are set precisely as they should be.

Thus any possible manual changes of aspect while the command station was turned off will be corrected.

21.3.4. Change of direction

21.3.4.1. Immediate stop of DCC locomotives

If this feature is active then all M4 decoders and DCC decoders will not only receive a change-of-direction command whenever the throttle knob is pressed down but an emergency stop command as well. This leads to a rapid stop of the locomotive which may lead to derailments in some instances.

Motorola® locomotives always receive this emergency stop command.

21.3.4.2. Deactivating change-of-direction feature of the throttle knob

Should you not wish to utilise the feature of changing direction by pushing the throttle far left (until you hear the "click") because you prefer to use the joystick or the touch panel for this purpose, simply place a tick in front of this command.

21.3.4.3. Delayed change of direction

If this feature is active then you must turn the throttle knob to the far left (until you hear the "click") and keep it in that position for a certain time until the locomotive changes direction. This option serves to avoid operator errors.

21.4. Accessories and routes

Here you can display, edit and delete all accessories and routes stored in the system.

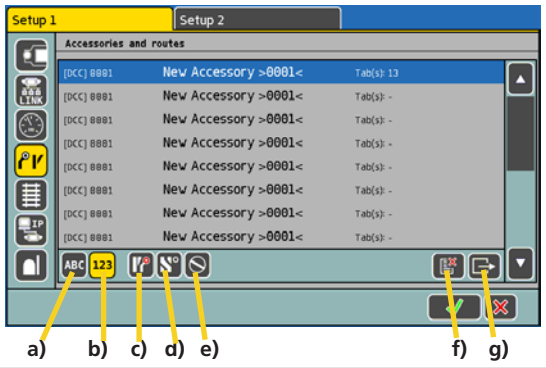

Figure 101

a) Sort by alphabet
b) Sort by accessory address
c) Filter "Accessories only"
d) Filter "Routes only"
e) Filter "Turntables only"
f) Delete part permanently (as well as all links)
g) Edit part

21.5. Data formats

Here you can enter important information regarding the desired data formats.

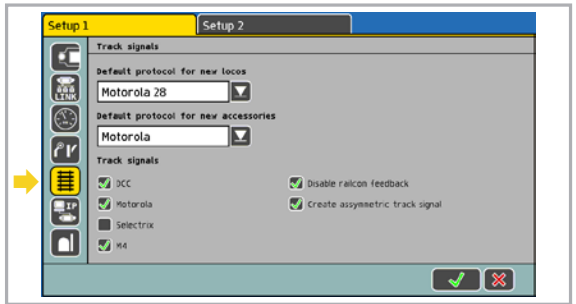

Figure 102

21.5.1. Default protocol for new locomotives

When you enter a locomotive via the locomotive choice list then the data format set here will be applied. Also refer to chapter 11.1.4.

21.5.2. Default protocol for accessories

The data format set here will be automatically used as the default value whenever you enter a new accessory.

21.5.3. Generated data formats

Here you set which data formats should be generated by the command station. Thus you can turn off certain data formats that are not needed.

Only activate the data formats that you really need. For instance, should you have no Selectrix® decoders then turn off this protocol. This may help to avoid operational problems. Of course you can enter new locomotives using such data formats in the locomotive list regardless whether this protocol has been activated or not.

Should you operate purely on a 3-rail system and you have switched off DCC and Selectrix® then you can add DCC locomotives to your list and call them up on your cab. In this case the command station will generate the required DCC data packets in order to run this locomotive despite the fact that DCC has been turned off.

21.5.3.1. Deactivating RailCom®

Here you can turn off RailCom®. This may be necessary for programming older SwitchPilot decoders. If you do not use any RailCom® capable decoders on your layout you should deactivate it in order to avoid the risk of problems.

21.5.3.2. Activating the asymmetric track signal

If this feature is activated then the command station will generate a special asymmetric track signal. This helps to suppress possible flicker of older (Märklin®) daylight signals, turnout lanterns and headlights of locomotives.

Please bear in mind that there will always be a slight flicker in older Märklin® vehicles. The only definite solution is to isolate the ground of the lights against the chassis. You will find hints on how to facilitate this in the various ESU manuals.

21.6. Access control

Here you can set various options that reduce or prevent unauthorised access, e.g. visitors cannot edit or delete loco data or – even worse – trigger a reset.

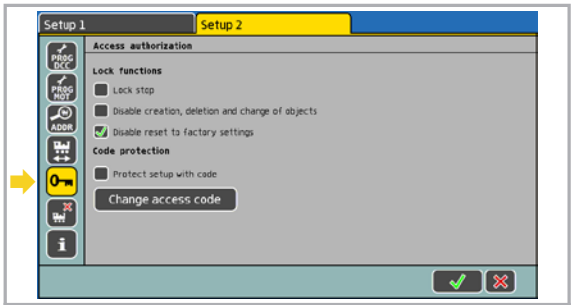

Figure 103

21.6.1. Lock functions

- "Lock stop function" prevents activating the emergency stop when pressing the stop button. This affects the integral stop button as well as any other stop buttons of external devices connected to ECoSlink and ECoSniffer.
- "Lock entering, deleting and editing objects" prevents any entering, deleting or editing of locomotives, turnouts, routes etc.. This is useful for public layouts where the users should be able to operate but not to effect any changes.
- "Locking the reset function to factory default values" deactivates the factory reset (also refer to chapter 21.1.4.)

21.6.2. Requesting code

You can protect access to the sub-menue "Authorised Access " with a code. This helps you to prevent any unauthorised modifications to the settings of the system.
First you have to define a 5-digit number code. This has then to be entered whenever anyone wants to open this menue.

21.6.2.1. Changing the code

- Press the screen button "Change Code" and another dialogue window opens where you can enter the new code.
- Delete the old code and enter the new one.
- Confirm this entry

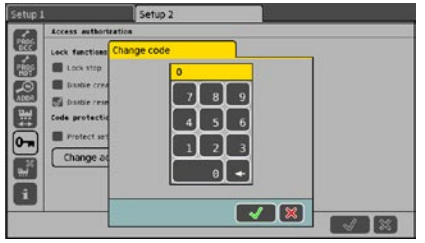

Figure 104

Make sure you remember your access code. Should you forget it the only way to reset it is via the computer interface (refer to chapter 24.2.5).
A reset of the code at the factory will cost money!

21.6.2.2. Activating the code

- Activate "Protect set-up with a password".
- When you next call up the "Set-up" you must enter this code.

21.7. Deleting objects

Here you can delete individual lists from the command station.

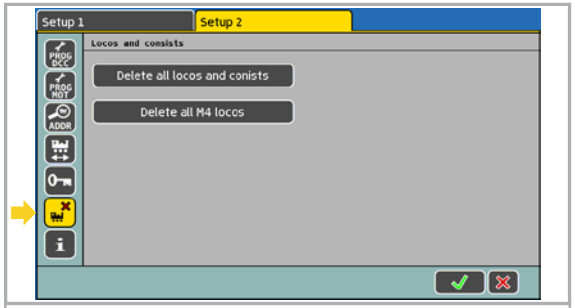

Figure 105

21.7.1. Delete locomotives and consists

Pressing this screen button results in the deletion of all locomotives and consists from the command station.

21.7.2. Deleting M4 locomotives

Pressing this screen button results in the deletion of all M4 locomotives from the internal locomotive list. After that all M4 locomotives on the layout will automatically register once again.

21.8. General information

Here you find some important info about your ECoS.

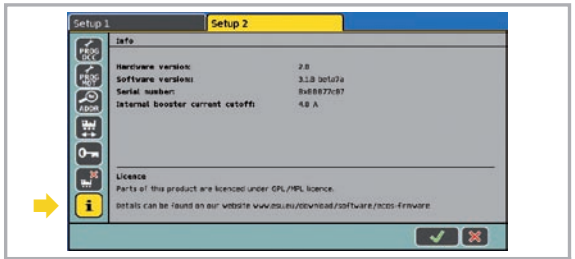

Figure 106

21.8.1. Software version

The software version relates to the internal software. Important: Whenever you contact ESU to ask questions relating to your ECoS you must know the software number.

21.8.2. Serial number

The internal serial number is valid for your ECOS only. You need this number when you register your ECoS with ESU. We also need to know this number in order to help you whenever you ask for support.

You will also need the serial number when you register in the ESU support forum. Chapter 27 provides more information.

21.9. Calibrating the touch screen

In some rare cases due to electrical or mechanical fatigue it may happen that the touch-sensitive screen must be calibrated again. You can start this process at any time.

- Press the functions buttons F2 and F7 of the left hand cab simultaneously.

Figure 107

- Recalibrate the monitor by touching the three crosses that appear one after another on the screen as close to their centre as possible.

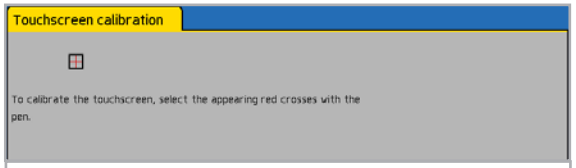

Figure 108

If the calibration has been successful the ECoS will restart automatically.

22. s88-bus-configuration

As mentioned in chapter 8.9 the individual s88-modules are linked like a chain. ECoS needs to know how many of these modules are connected and if they have 8 or 16 ports. This is done in the set-up menue.

- Open the set-up menue.
- Select "Devices in the System" in the sub menue.
- Select "s88-Bus-Control" from the list in "Devices on ECoS-link" (also see Figure 94).

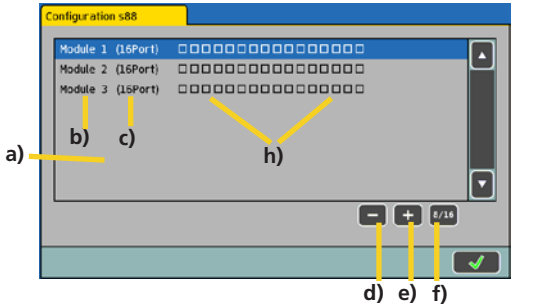

Figure 109

- Push "Edit" and a dialogue window called "s88 Configuration" will open:
  - a) List with all currently known s88-modules
  - b) Name of module
  - c) 8- or 16-port indicator
  - d) Screen button "Delete"
  - e) Screen button "Add"
  - f) Screen button "Switch over between 8 and 16 ports"
  - g) s88 monitor

  You must make an entry for each s88 module on your layout:
- Press the screen button "Add".
- Touching this screen button shifts between the 8-port and the 16-port module.
- Confirm your entry.

22.1. s88 monitor

Behind each s88 module there are 8 or 16 squares. They always indicate the current status of the feedback contacts. The s88 monitor is quite helpful when looking for faults during the installation of s88 modules.

23. Current monitor

The current monitor provides valuable information regarding the energy demand of your layout. With its assistance you can determine the actual power consumption of your locomotives and thus better plan the power districts on your layout.

The current monitor displays the current of the internal booster as well as of the ECoSBoost booster, the actual track voltage and the internal temperature of the device.

You will find the current monitor in the set-up menu.

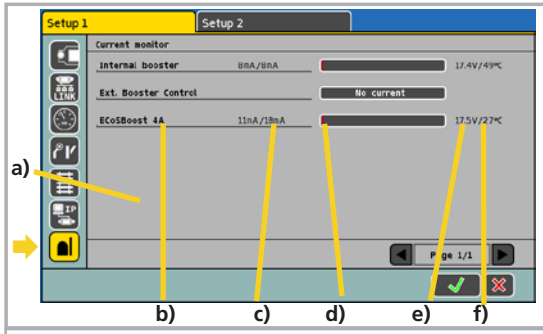

Figure 110

a) List of all boosters in the system
b) Name of boosters (as configured)
c) Present current / maximum current
d) Bar display of current
e) Present track voltage in the booster district
f) Present internal temperature of the booster

The current monitor also shows which booster has been switched off due to a short circuit. This is particularly helpful when trying to find a fault on a larger layout.

24. Computer interface

This enables you to connect your ECoS with your PC. ECoS works with several operating systems such as MS-Windows®, Apple® or Linux®. ECoS is based on open standards for data transfer and does not require any software installation on your PC. All you need to have installed and configured is an Internet browser (e.g. Mozilla Firefox®, MS Internet Explorer® or similar).

You can update your software via the computer interface and also save all configuration data on your PC for later use should this become necessary. Furthermore you can display the information of the touch screen on the PC monitor or display the internal lists for locomotives, accessories and routes.

Communication between ECoS and your PC runs over a so-called IP-connection. In such IP-networks it is important that each device resp. participant has a unique IP-address. With the aid of these IP-addresses all connected devices can find each other.

Therefore you must configure a correct IP-address in your ECoS and also on your computer. Otherwise data transfer cannot be facilitated. The PC address and the command station address may not be the same.

First one must establish a correct connection between these two devices. Details regarding this can be found in chapter 8.6.

24.1. IP Set-up

If you have connected your PC with a broad band internet (e.g. DSL) provider or if you even have a wireless router or operate a small home network it is likely that you have a so called DHCP-server in your network: This assigns automatically IP-addresses to all devices. Most Internet routers function as DHCP-servers: if this

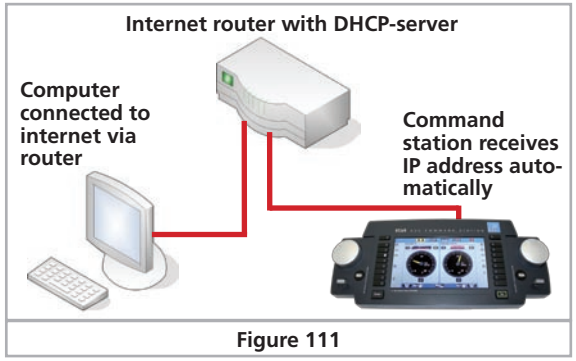
Internet router with DHCP-server
Computer connected to internet via router
Command station receives IP address automatically

Figure 111

is the case please read on in chapter 24.1.2.

If you do not have a DHCP-server or you want to connect ECoS with a PC that is not connected to a network or works with a static (manually assigned) IP-address continue reading below.

24.1.1. Manually assigning IP-Addresses in Windows

If you use a static IP-address and your PC is already configured you do not have to change anything in your PC. Continue reading in chapter 24.1.2.

If you use a PC that has not been connected to a network until now you have to check the IP-settings first. We present this as an example for MS Windows® XP. Should you have another operating system, consult your system administrator or the manual.

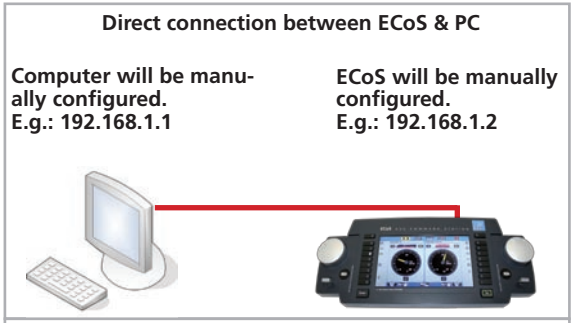
Direct connection between ECoS & PC
Computer will be manually configured.
E.g.: 192.168.1.1
ECoS will be manually configured.
E.g.: 192.168.1.2

Figure 112

We assume that you will establish a network with your PC and your ECoS only (without any other devices). This example is only valid for this particular case. If in doubt consult a computer specialist.

- Make sure that your PC and ECoS have connected to the network as per figure 8.6.
- Click on "Start" in Windows, Select "Settings" and then "System Control".
- You might need to click on "Switch to classic view" (a).

Figure 113

- Find the pictogram "Network Connections" and open it.
- Now a window similar to the one shown in Figure 114 should open.

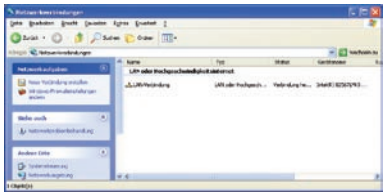

Figure 114

- Search for the used network connection. In most cases this is called "LAN-Connection".
- Double click with the mouse on your connection. The following dialogue window will open (see figure 115).

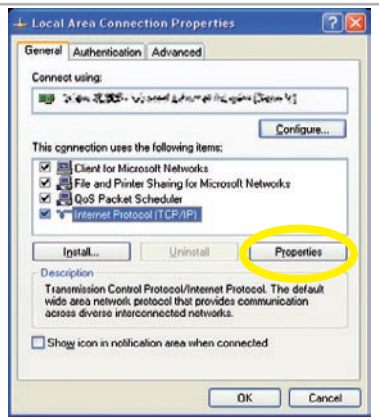

Figure 115

- Mark "Internet-Protocol" in the list and click on "Properties".

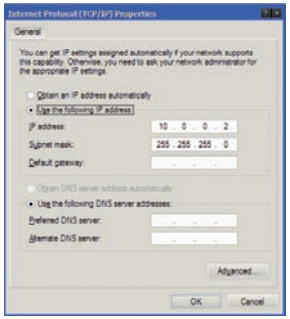

Figure 116

- Select "Use the following IP-address" and enter the value exactly as shown in Figure 116.
- Confirm your entry with "OK".
- Confirm again with "OK" to close the window "Properties".

24.1.2. Assigning an IP-address on ECoS

Now you have to assign an IP-address to ECoS.

- Open the set-up menue.
- Select "Network Settings" from the list.

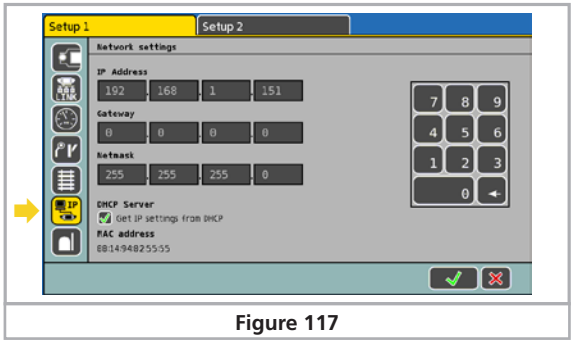

Figure 117

- Enter suitable values for your home network in the fields "IP-Address" and "Net Mask". Should you put the above example into practice enter the values precisely as shown.
- Make sure the tick at "Obtain IP-Address via DHCP-Server" is NOT set.
- Confirm your entry and leave the set-up menue.

Restart your ECoS (shut down completely and then restart).

Continue in chapter 24.2.

24.1.3. DHCP-Server in the net

A DHCP-server in the net automatically assigns IP-addresses to all devices in the network. ECoS checks by default during each start up procedure if such a server is available and requests a valid IP-address. All you have to do is read out the assigned IP-address and enter it in the address line of the internet browser.

- Open the set-up menue of ECoS.
- Open the network set-up as per Figure 117.
- Make sure the tick at "Obtain IP-Address via DHCP-Server" is set.
- Read and remember the "IP-Address". The figure will be needed for the next step.

24.2. Web interface

- To establish a connection with ECoS start your Internet browser.
- Type in the upper command line: **http://IP-Adresse**

  IP-Address means in this case the address assigned to ECoS. Confirm with "Enter".
- In our example from chapter 24.1.1 you enter:

  http://192.168.1.2

  and press the return key.
- After a short while the start display of ECoS will have been established. It must look like the following:

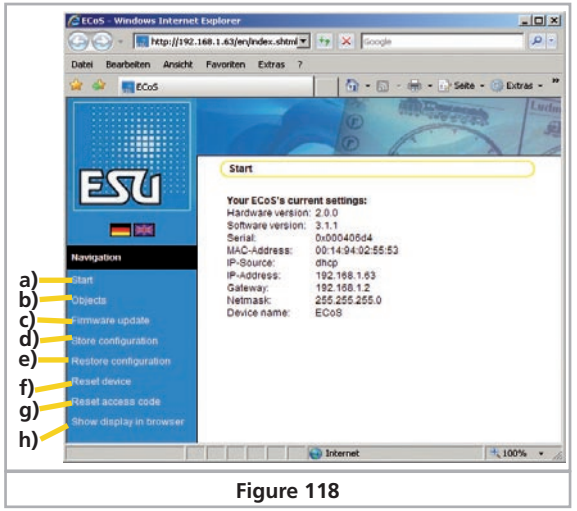

Figure 118

a) Menue „Start"
b) Menue „Objects"
c) Menue "Firmware update"
d) Menue "Store configuration"
e) Menue "Re-establish configuration"
f) Menue "Reset device"
g) Menue "Reset Access Code"
h) Menue „Show display in browser"

24.2.1. Firmware update

First save your data as per chapter 24.2.2 before you start a firmware update.

This enables you to update the operating software of your ECoS. First you must download new firmware packets from our website and save it locally on your PC. You will find the latest version of our software at:

http://www.esu.eu/download

You will only find the firmware downloads once you have established an access account to our website by providing the serial number of your command station. We strongly recommend applying for such an account otherwise you will not be able to benefit from new functionalities and bug fixes for your command station. How you can gain access is described in chapter 27.

Update your firmware only if you want to upgrade relevant errors or new functions that you absolutely need. Never change the configuration of a system that is stable and works without problems. Before you install updates do a data back-up!

Make sure that you remove the batteries from your command station prior to conducting an update. Only reinsert the batteries once you have completed the update.

- In order to start an update select "Firmware update" and then press "Search" which will get you to the directory of the desired firmware update.
- Start the update by pressing "Transmit".
- Now the download will be started. It may take up to 10 minutes before the new firmware has been downloaded. After that ECoS will start again at least once and unzip and install the new data. Therefore this start up procedure takes much longer than usual.

Please be patient: an update may take even up to 25 minutes. Do not switch off ECoS during this process! This could result in n complete non-operable software.

Also make sure that the power supply to your PC and your ECoS is not interrupted during this process. An incomplete update may render your ECoS useless.

- After a successful update ECoS should start with the standard display.

24.2.2. Backup configuration
You should make it a habit to save your loco libraries on your PC. Should you delete the lists by mistake then you have a backup available thus avoiding having to go through the process of entering all data individually once more.

- Select "Save Configuration" from the menue.
- Click on the screen button "Save Settings".
- Select "Save File" and save your file on your PC.

24.2.3. Restore configuration
When restoring the configuration all current settings of ECoS will be replaced by the ones saved in the configuration file.

- Select "Restore Configuration" from the menue.
- Select the desired file that you wish to restore with the aid of the "Browse" button.
- Start the download by pushing the "Send" button
- The configuration files of ECoS will be deleted and replaced by the new ones. After that ECoS will re-start.

24.2.4. Reset
Here you can trigger a reset of your command station to factory default values. All data in the command station will be deleted including all lists of locomotives, turnouts, routes and track diagrams.
This reset is conducted immediately without requiring confirmation.

24.2.5. Resetting the access code
Here you can reset the access code back to the default value "00000" in case you have forgotten the code. Follow the instructions on the screen.

24.2.6. Display touch screen on computer monitor
For training sessions or demonstrations it is useful to represent the info on the touch screen on a larger PC monitor. This is precisely the function offered here.

Figure 119

The screen shot is automatically updated 4-times per second. Data entry on the monitor is not possible.

24.3. Train control software on your PC
ECoS has a communication protocol to hook up to external train control programmes run on your PC. Ask your software supplier if and when his software will support the ECoS communication protocol.
All renowned software producers and many free-of-charge programs support the ECoS.
The protocol corresponds with the ESU ECoS. From a computer point of view there are no differences.
Please refer to the description of the interface on our web page at www.esu.eu/download should you wish to write your own software. The document is only accessible if you have opened an account on our website using the serial number of your ECoS. You will find more details in chapter 27.

25. Fixing bugs

Your ECoS is a modern but complex system. Therefore – like with all software based systems – you may occasionally encounter technical problems during operation. In many cases you will be able to rectify such problems yourself. This chapter explains the sagety systems of your command station and their application.

25.1. Rescue mode
As from software version 3.0.0. every ECoS has an additional rescue system parallel to the operating system. The rescue system cannot be modified and is normally not active.

25.1.1. Activating the rescue system
The rescue system should only be used when the normal operating system does not work properly any more. One of the main reasons for such a failure are software updates that went wrong (also refer to chapter 24.2.1.). In that instance you can install the rescue system and try to reinstall the normal operating system.

Whenever you activate the rescue system then the normal operating software will be completely deleted. Therefore it is obligatory that you reinstall your operating system. Always try to backup your data prior to this.

Figure 120

In order to activate the rescue mode proceed as follows:

- Disconnect your command station from the mains.
- Press the function buttons F2 and F7 of the left cab simultaneously and hold them down.
- Switch on your command station.

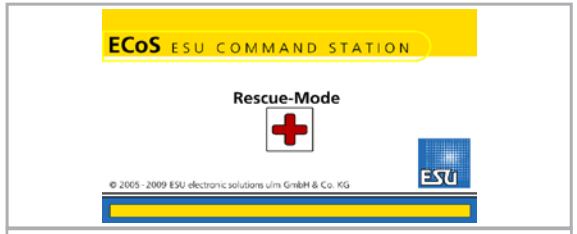

Figure 121

When you see the screen as per Figure 114 the rescue mode is active. Now you can start installing the operating system via the web interface. You can influence the IP settings.

25.1.1.1. Rescue system via DHCP

If you use a DHCP server (also refer to chapter 24.1.) you can force the rescue system to take the IP address from this server.

- Disconnect your command station from the mains.
- Press the stop button and the function button F8 of the left cab simultaneously and hold them down.

Figure 122

- Switch on your command station.

Please hold down both buttons during the start-up of your command station (screen as per figure 121 will open).

25.1.1.2. Rescue system via Static IP

You can force the rescue system to accept a preset IP address. This option should only be used by experienced computer specialists.

The IP address is **192.168.1.151** /24.

- Disconnect your command station from the mains.
- Press the stop button and the function button F7 of the left cab simultaneously and hold them down.

Figure 123

- Switch on your command station.

Please hold down both buttons during the start-up of your command station (screen as per figure 121 will open).

25.2. Execute a factory reset

In many cases technical problems with the software are not actually caused by the incorrect installation of the software but rather by errors in the lists of locomotives, accessories, routes or the track diagrams. Such errors in the so called "Play status" can lead to unusual behaviour of the command station.

In the worst case the command station gets stuck during start-up and the screen remains blank.

If this is the case you should first delete all lists that contain objects. Such a factory reset can be accomplished during the start-up phase.

- Disconnect your command station from the mains.
- Press the stop button and the function button F6 of the left cab simultaneously and hold them down

Figure 124

- Switch on your command station.
- Hold down the buttons during the start-up phase until the "Go" button blinks shortly.

Do not mistake the function of the rescue mode with the factory reset. Always try to re-establish the command station with a reset first. Basically the rescue mode must only be activated whenever a software update went wrong (for instance due to a power interruption during the update).

26. ESU Support & Registration

As the owner of an ECoS you are entitled to technical support by ESU.

There are many ways to get in touch with us should you encounter any problems or if you have any suggestions.

26.1. Registration

We want to support you in the best possible way. Therefore we kindly ask you to establish an "access account" on our website at **http://www.esu.eu/nc/en/register/**.

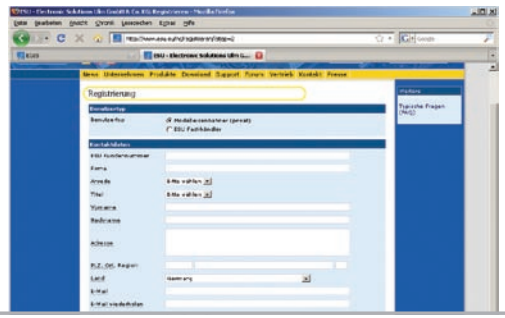

Figure 125

What advantages does registration offer?

When registering you enter the serial number of your ECoS. Thus your ECoS is automatically registered with ESU. Should there be any software or other problems we can then inform you directly. The most efficient way is doing this via the internet.

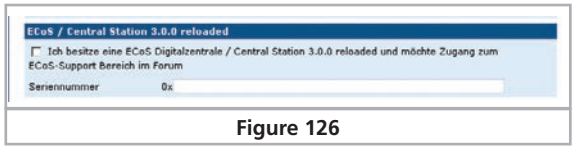
ECoS / Central Station 3.0.0 reloaded
Ich besitze eine ECoS Digitalzentrale / Central Station 3.0.0 reloaded und möchte Zugang zum ECoS-Support Bereich im Forum
Seriennummer
0x

Figure 126

In addition after registering you will get access to the latest software versions.

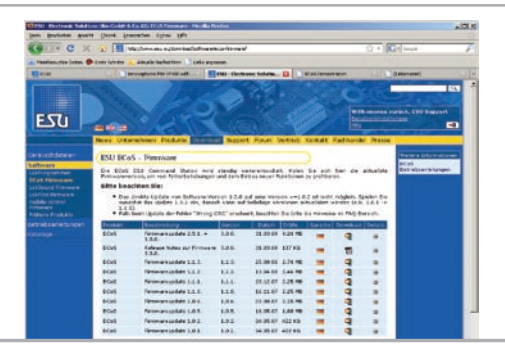

Figure 127

Registered users (!) can download such updates free of charge at any time.

All following software updates for the ECoS are free of charge. Guaranteed, you can rely on it.

Of course, you can also participate in the ESU support forum.

26.2. Forum

Since its introduction in autumn 2006 the ESU support forum has grown to be one of the most successful internet platforms. In this forum you may ask any questions about ESU products. Our support team will endeavour to resolve all problems together with you. That way everyone benefits from the common knowledge, since other users can also provide answers.

There is a special section of the forum reserved solely for the owners and users of an ESU ECoS. This „exclusivity" assures that only customers who really own an ECoS can take part in the discussions. The quality of the answers in this forum is accordingly high.

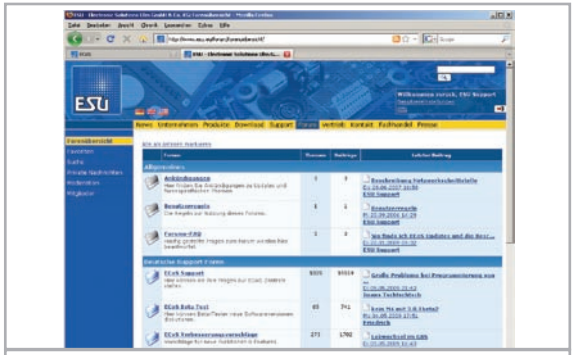

Figure 128

26.3. Technical hotline

Your model train or hobby shop is your competent partner for all your questions regarding ECoS command station as well as model trains in general.

There are many ways to get in touch with us. Please direct any questions related to the ECoS via the support forum on our website.

Should you not have access to the internet you are welcome to send a fax. Please always mention your fax number or email address to which we should replay to.

The telephone hotline is often very busy. Therefore you should only try this method if you have really special requests. Make use of our internet forums or have a look at our website. There you will already find some answers and possibly also hints provided by our customers in the "Hints & tricks" section that may be of assistance to you. Of course we are pleased to assist you as well.

Hotline:	+49 (0) 700 - 56576863 *) (0)700 - LOKSOUND Tuesday and Wednesday 10:00 am - 12:00 am
Fax:	+49 (0) 700- 37872538 *)
Post:	ESU electronic solutions ulm GmbH & Co. KG -technischer Support- Industriestrasse 5 D - 89081 Ulm

www.esu.eu

*) 0.12Euro per minute from the network of the Deutsche Telekom

27. Service & repair

After having procured an ECoS you of course are also entitled to certain services by ESU.

27.1. Lump sums for repair & service

Of course an ECoS can be repaired even if it is older than 2 years. In that case you may also send your command station to us for repair by our specialists.

We charge a general fee for repairs as a lump sum. You will receive an invoice together with the repaired or exchanged part. We regret that we cannot provide cost estimates prior to conducting the repair. If the repair is not covered by the warranty then we automatically apply the lump sums for repairs.

In order to simplify matters we have established the following amounts for the ECoS:

Type of fault	Price in €
Replacement of display, touch pad and backlight	99.50
Repair of the track output or programming output	72.50
Replacing a defect main board	95.50
Replace defect ECoSniffer module	59.50
Replace Plug In module (throttle with motorised potentiometer and joystick)	59.50
Replace housing parts (e.g.: upper cover due to breakage, keyboard mats, battery compartment lid, etc.)	19.50
Installing new software onto your command station at our premises	19.50

These prices include 19% VAT. The command station must be packed properly and postage must have been paid. You will find more details regarding the handling of repairs and repairs under warranty on our website at:

http://www.esu.eu/en/support/warranty-repair

There you will also find the current prices for repairs.

Notes

28. Warranty certificate

24 Months warranty form date of purchase

Dear customer,

Congratulations on purchasing this ESU ECoS command station. This quality product was manufactured applying the most advanced production methods and processes and was subject to stringent quality checks and tests.

Therefore ESU electronic solutions ulm GmbH & Co. KG grants you a warranty for the purchase of ESU products that far exceeds the national warranty as governed by legislation in your country and beyond the warranty from your authorised ESU dealer. ESU grants an extended

Manufacturer's warranty of 24 months from date of purchase

Warranty conditions:

This warranty is valid for all ESU products that have been purchased from an authorised ESU dealer.

Any service, repair or replacement under this warranty requires proof of purchase. The filled in warranty certificate together with the receipt from your ESU dealer serves as proof of purchase. We recommend keeping the warranty certificate together with the receipt.

In case of a claim please fill in the enclosed failure report card as detailed and precise as possible and return it with your faulty product.

Please use the appropriate postage when shipping to ESU.

Extend of warranty / exclusions:

This warranty covers free of charge repair or replacement of the faulty part, provided the failure is demonstrably due to faulty design, manufacturing, material or transport. Any further claims are explicitly excluded.

The warranty expires:

1. In case of wear and tear due to normal use.
2. In case of conversions of ESU – products with parts not approved by the manufacturer.
3. In case of modification of parts.
4. In case of inappropriate use (different to the intended use as specified by the manufacturer).
5. If the instructions as laid down in the user manual by ESU electronic solutions ulm GmbH & Co. KG were not adhered to.

There is no extension of the warranty period due to any repairs carried out by ESU or replacements.

You may submit your warranty claim either with your dealer or by shipping the product in question with the warranty certificate, the receipt of purchase and the fault description directly to ESU electronic solutions ulm GmbH & Co. KG at:

Electronic solutions ulm GmbH & Co. KG
- Garantieabteilung -
Industriestraße 5
D-89081 Ulm

Goods Return Note

1. Customer data (Please write in block letters)

Name: .....
Street: .....
ZIP / City: .....
Country: .....
Email: .....
Phone: .....
Date: .....
Signature: X

2. Serial number of the device

ID-code: 0x

3. Type of defect

- ☐ Faulty display
- ☐ Software
- ☐ Throttle
- ☐ Joystick/Keyboard
- ☐ Short circuit
- ☐ Output programming track
- ☐ Main output
- ☐ No picture (no reaction)

4. Description of fault (use extra page if necessary)

5. Receipt of purchase

Please add the receipt to your return!

6. Your retailer / hobby store

Stamp or address of your retailer

29. Annex

29.1. Technical data

H4-booster with 4.0 A continuous output
H4-programming track output with 0.6A
RailCom® feedback decoders with integral cut-out device (“Global Detector“)
7 inch TFT LCD display with touch panel and LED backlight (white)
32-Bit ARM 720T controller, 64 Mbytes Flash ROM, 64 Mbytes RAM, Linux® operating system
16 Bit real time co-processor
2 x motorised potentiometer-throttles with dedicated end position and locomotive choice button
2 x Two-way-analogue-joysticks
2 x 9 function buttons as well as Stop and Go button
3 Sockets for ECoSlink devices
Socket for ECoSlink bus extension
AUX socket for system extensions
Galvanically separated booster socket for DCC-conform and Märklin® 6017-compatible boosters
Galvanically separated ECoSniffer input for connecting old systems
Galvanically separated s88-bus input for feedback decoder
10/100 Mbit Ethernet-socket (RJ45)
1 ECoSlot-module to accommodate a radio receiver
Switchable power supply 90VA

29.2. Code table for accessory decoders

The table contains the link between the status of the DIP-switches and the turnout address as well as to the Märklin® keyboards.

Keyboard number	Keyboard Button	Turnout address	Turnout decoder DIP-switch on							
1	1..4	1-4	-	2	3	-	5	-	7	-
1	5..8	5-8	-	-	3	-	5	-	7	-
1	9..12	9-12	1	-	-	4	5	-	7	-
1	13..16	13-16	-	2	-	4	5	-	7	-
2	1..4	17-20	-	-	-	4	5	-	7	-
2	5..8	21-24	1	-	-	-	5	-	7	-
2	9..12	25-28	-	2	-	-	5	-	7	-
2	13..16	29-32	-	-	-	-	5	-	7	-
3	1..4	33-36	1	-	3	-	-	6	7	-
3	5..8	37-40	-	2	3	-	-	6	7	-
3	9..12	41-44	-	-	3	-	-	6	7	-
3	13..16	45-48	1	-	-	4	-	6	7	-
4	1..4	49-52	-	2	-	4	-	6	7	-
4	5..8	53-56	-	-	-	4	-	6	7	-
4	9..12	57-60	1	-	-	-	-	6	7	-
4	13..16	61-64	-	2	-	-	-	6	7	-
5	1..4	65-68	-	-	-	-	-	6	7	-
5	5..8	69-72	1	-	3	-	-	-	7	-
5	9..12	73-76	-	2	3	-	-	-	7	-
5	13..16	77-80	-	-	3	-	-	-	7	-
6	1..4	81-84	1	-	-	4	-	-	7	-
6	5..8	85-88	-	2	-	4	-	-	7	-
6	9..12	89-92	-	-	-	4	-	-	7	-
6	13..16	93-96	1	-	-	-	-	-	7	-
7	1..4	97-100	-	2	-	-	-	-	7	-
7	5..8	101-104	-	-	-	-	-	-	7	-
7	9..12	105-108	1	-	3	-	5	-	-	8
7	13..16	109-112	-	2	3	-	5	-	-	8
8	1..4	113-116	-	-	3	-	5	-	-	8
8	5..8	117-120	1	-	-	4	5	-	-	8
8	9..12	121-124	-	2	-	4	5	-	-	8
8	13..16	125-128	-	-	-	4	5	-	-	8
9	1..4	129-132	1	-	-	-	5	-	-	8
9	5..8	133-136	-	2	-	-	5	-	-	8
9	9..12	137-140	-	-	-	-	5	-	-	8
9	13..16	141-144	1	-	3	-	-	6	-	8
10	1..4	145-148	-	2	3	-	-	6	-	8
10	5..8	149-152	-	-	3	-	-	6	-	8
10	9..12	153-156	1	-	-	4	-	6	-	8
10	13..16	157-160	-	2	-	4	-	6	-	8

Keyboard number	Keyboard Button	Turnout address	Turnout decoder DIP-switch on							
11	1..4	161-164	-	-	-	4	-	6	-	8
11	5..8	165-168	1	-	-	-	-	6	-	8
11	9..12	169-172	-	2	-	-	-	6	-	8
11	13..16	173-176	-	-	-	-	-	6	-	8
12	1..4	177-180	1	-	3	-	-	-	-	8
12	5..8	181-184	-	2	3	-	-	-	-	8
12	9..12	185-188	-	-	3	-	-	-	-	8
12	13..16	189-192	1	-	-	4	-	-	-	8
13	1..4	193-196	-	2	-	4	-	-	-	8
13	5..8	197-200	-	-	-	4	-	-	-	8
13	9..12	201-204	1	-	-	-	-	-	-	8
13	13..16	205-208	-	2	-	-	-	-	-	8
14	1..4	209-212	-	-	-	-	-	-	-	8
14	5..8	213-216	1	-	3	-	5	-	-	-
14	9..12	217-220	-	2	3	-	5	-	-	-
14	13..16	221-224	-	-	3	-	5	-	-	-
15	1..4	225-228	1	-	-	4	5	-	-	-
15	5..8	229-232	-	2	-	4	5	-	-	-
15	9..12	233-236	-	-	-	4	5	-	-	-
15	13..16	237-240	1	-	-	-	5	-	-	-
16	1..4	241-244	-	2	-	-	5	-	-	-
16	5..8	245-248	-	-	-	-	5	-	-	-
16	9..12	249-252	1	-	3	-	-	6	-	-
16	13..16	253-256	-	2	3	-	-	6	-	-
-	-	257-260	-	-	3	-	-	6	-	-
-	-	261-264	1	-	-	4	-	6	-	-
-	-	265-268	-	2	-	4	-	6	-	-
-	-	269-272	-	-	-	4	-	6	-	-
-	-	273-276	1	-	-	-	-	6	-	-
-	-	277-280	-	2	-	-	-	6	-	-
-	-	281-284	-	-	-	-	-	6	-	-
-	-	285-288	1	-	3	-	-	-	-	-
-	-	289-292	-	2	3	-	-	-	-	-
-	-	293-296	-	-	3	-	-	-	-	-
-	-	297-300	1	-	-	4	-	-	-	-
-	-	301-304	-	2	-	4	-	-	-	-
-	-	305-308	-	-	-	4	-	-	-	-
-	-	309-312	1	-	-	-	-	-	-	-
-	-	313-316	-	2	-	-	-	-	-	-
-	-	317-320	1	-	3	-	5	-	7	-

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